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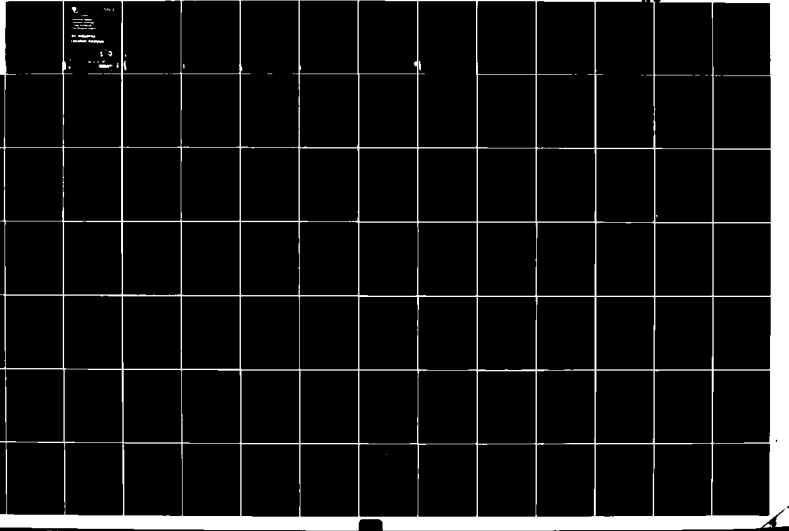

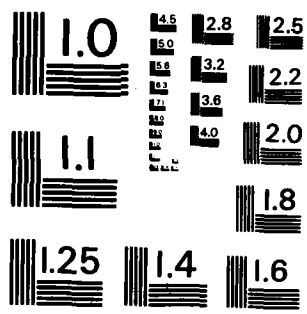

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Contract Report 81-CR5
December 1981

Determining Industrial Comparative Advantages In Areas Of Proposed Water Navigation Projects:

An Industrial Location Analysis

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DETERMINING INDUSTRIAL COMPARATIVE ADVANTAGES IN AREAS OF PROPOSED WATER NAVIGATION PROJECTS:

An Industrial Location Analysis

a report

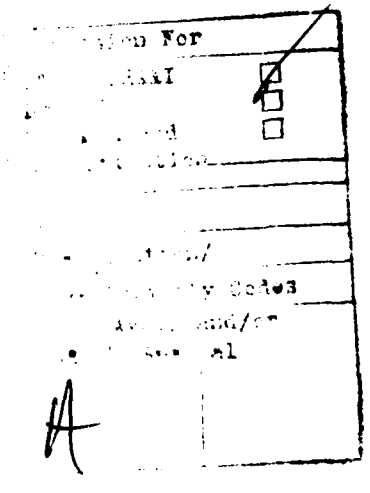
submitted to

U.S. Army Corps of Engineers
Water Resources Support Center
Institute for Water Resources

by

U.S. Army Corps of Engineers
Tulsa District

Samuel Ben-Zvi



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1.0 Introduction

1.1 Background

The economic feasibility of investments in water development projects is traditionally evaluated in terms of anticipated stream of benefits discounted to the present. These benefits are matched against present and discounted future stream-of-costs to yield a benefit-cost ratio.

The implementation of a benefit-cost framework requires estimates of direct and indirect benefits and costs, over time, assoicated with the project. To arrive at such estimates requires an understanding of the chain of processes that must be triggered by the project to bring about the anticipated benefits. Equally important, is an understanding of the conditions that need to prevail in the project area in order to yield the benefits to justify the project.

The triggering event produced by a project is, first and foremost, a reduction in the price of the resource(s) supplied by the project (for a given level of output). This event renders the project area an improved competitive position relative to other areas. Since producers react to regional differentials in resources availability and cost, the project, it is argued, induces industries to locate and/or expand operations in the project area. The ensuing expansion in employment, output and income are the economic benefits emanating from the project. The question is, however, are these conditions sufficient to attract producers to locate in the area?

Unfortunately, while there are a number of theories discussing the chain of events that must be triggered by public investment to induce economic benefit, there is little analysis concerning the conditions that must prevail in a project area to allow such economic benefits to materialize.

In fact, most analyses of public projects and the analytical tools used in these analyses assume an infinitely elastic supply schedule of the production factors needed to satisfy the projected increases in output resulting from a project. Similarly, markets are assumed to exit such that any incremental output induced by the project can be absorbed. Stated simply, projected benefits induced by a water development project rest on the assumption that the project area possesses the right conditions for such benefits to materialize. These assumptions, obviously, oversimplify reality in that they fail to recognize the complexity and dynamics of the location decision of producers. These decisions are determined by a multitude of factors, all of which bear in some way on firms' cost-revenue relationships. While the provision of the resource made available by the project (say, transportation services) might be a necessary condition for a firm to locate or expand in the project area, it might not always be a sufficient condition. To assume otherwise, therefore, might lead to an overstatement of projected project economic benefits and at times, to the approval of projects that are economically unfeasible. Equally important, such overstatement of benefits tends to raise project area inhabitants' expectation which, when fail to materialize, cause disappointment, bitterness and justified criticism.

1.2 Purpose

Given these observations, it is the purpose of this study to select a methodology that will provide a screening mechanism with which project areas can be evaluated as to their comparative advantage to attract manufacturing entities. This screening mechanism should have a dual capability. First, it should allow investigators to determine what kind of manufacturing operations can successfully operate in the project area, given the area's inventory of productive factors and other location attributes, and given industries' locational requirements. Second, since many locational factors are variables subject to policy decisions (industrial parks, for example), the screening mechanism should allow to determine which areas' resource deficiencies should be corrected, through policy decisions, to maximize the area's attractional pull to target *industries*.

The end result of the selected methodology should be the provision of an analytical tool with which analysts can evaluate project areas' potential for industrial development, determine which specific industries or types of operations are most likely to locate in the area and finally, help determine what corrective action should be taken to increase the area's attractiveness for industrial location.

The results of such analyses, when combined with projected output of a water development project should allow for a more accurate determination of regional benefits triggered by the project.

1.3 Methodology and Outline

Consistent with the purpose of this study to select a methodology by which areas with proposed water navigation projects can be evaluated

as to their comparative advantage for industrial operations, it is proposed to conduct the analysis within the framework of industrial location theory and the relevant industrial location analysis procedure.

To accomplish this, the first part of this study will establish a general framework of a cause-effect relationship of water navigation projects and their effect on regions' economies. Within this framework, part two will focus on the locational behavior of industries. This will be done by first presenting a general overview of the theory of the location of manufacturing to be followed by a discussion of major determinants that influence the location decision of firms and industries. The theory of location and the general observations made relative to locational factors will be supported by the finding of various empirical studies. Part three of the study will present and analyze various analytical tools currently used in the analysis of industrial location. Finally, the method of analysis deemed most appropriate to accomplish the study's purpose will be selected, described and evaluated as to its applicability to the Corps of Engineers' projects.

2.0 Regional Impact of Water Resources Development

An appropriate point of departure for the analysis of the effects of water navigation projects on regional industrial development is an overview of the manner by which water resources developments affect regional economic activities. If indeed investments in water projects induce regional economic development, it should be possible to trace and identify the sequence of events that lead to such development.

Lewis, et al [5] list a sequence of what they term, "microchanges in the regional economy" that describes the process of economic growth emanating from water resources development. This sequence includes the following phases:

(1) Resources development

(2) Changes in relative factor productivities

(3) A broadening of the range of producer and consumer choice

(4) Intra- and interregional movement of capital and labor

(5) Direct and indirect forward and backward linkage effect

(6) Second order impacts associated with agglomeration and scale economies and the attainment of minimum threshold levels for development of specific economic activities

These phases Lewis, et al point out, "are not necessarily independent; they tend to reinforce as well as to occur serially" [5, page 81]. Also, the project size bears on the degree of the development potential that can be realized. For the analysis of these phases it is assumed that the project provides water transportation, water supply, flood control, hydroelectric power and recreation. This assumption is accepted for the purpose of this study for water navigation projects

quite often generate these services as a by-product. The following is a brief elaboration on some key occurrences that might take place at each phase:

(1) Resources development--activity potential:

The main objective of the project--a navigable waterway--is expected to yield an alternative mode of transportation, one that is both competitive with and complementary to existing modes of transport. A navigable river is competitive with other forms of transportation in that it offers, in most instances, lower rates per ton/mile shipments of certain commodities to certain distances (usually long hauls of barge-load lots). It is complementary to other modes--truck and rail--in that it offers service which is restricted to locations along the river and, therefore, such service needs to be augmented with truck and/or rail service to reach destinations away from the river. The significance of the navigation project in the regional scheme of development lies with the introduction of a new transportation alternative; it offers transportation services at low rates and it exerts downward pressure on rates charged by competing modes. Consequently, regional firms realize reduced production and distribution costs and the associated impact on factors' productivity.

(2) Changes in relative factor productivities:

Phase two, Lewis, et al [5, page 82] point out ". . . is perhaps the most fundamental, as it will lead to those changes in factor returns and industrial cost structure that are associated with both the interregional movement of people and productive capacity,

and increases in the productive capability of existing labor and capital." The significance of this phase will be emphasized later when industrial location decisions are discussed. At this point it should be mentioned that the reduction in transport costs, brought about with the introduction of the navigation project, will prompt the profit maximizing firm to substitute inputs whose costs have been lowered, within technical constraints, for inputs whose costs remain unchanged. It should be pointed out that a transportation service per se is not a productive factor that can be substituted for other inputs. However, lower transportation rates allow in-bound shipment of certain raw materials, for example, that heretofore were too "expensive" to be used as an input. These raw materials are substituted for the ones currently being used. Thus, transportation services are, in a roundabout manner, a substituting factor input. For the profit maximizing firm, factor substitution is prompted by the expected result of such action--higher factor returns, both labor and nonlabor factors. The increases in factor returns result in an increase in regional income, which is the third phase in the development sequence.

(3) A broadening of the range of producer and consumer choice: The broadening of the range of producer and consumer choice, brought about by the project, is manifested in a variety of ways. First, the increase in the marginal productivity of labor results in higher wage rates and, therefore, income (the magnitude of such change depends, of course, on changes in the supply function of labor). This change in income affects

consumers' choice relative to the quantity and type of goods, services, leisure, etc. that are purchased. Second, increased production activities broaden both the range of employment opportunities and the range of services heretofore unavailable: for example, a new lake that serves as a recreational facility. Finally, the navigable channel, offering a new transportation mode, lower costs of inbound and outbound shipments and increased supplies of productive factors (including, for example, industrial parks that are usually built in port locations), broadens producers' choices.

(4) Intra- and interregional movement of capital and labor: If the project and its by-products (flood control, increased water supply, recreation facilities, etc.) enhance the region's resources availability, quantity and quality, relative to other regions, it might be expected that both inter- and intraregional factor movement will occur. The attraction of higher wage rates, employment opportunities and recreational amenities should stimulate the movement of people to the region. Similarly, the availability of water transportation and other resources now made available with the project should serve as an inducement to industry to locate in the region. The interaction of changes in relative factor productivities and the influx of production factors--labor and non-labor--will result in changes in both input-output relationships and the composition and level of final output of industries.

(5-6) The sequence of the four previous events culminate with phases (5) and (6):

In phase five, the increase in population and economic activities induce an increased level of activities in the retail, wholesale and service sectors to satisfy both consumer and industrial demand. Obviously, the degree to which all these activities and associated income can be captured by the region depends to a great extent on the level of the region's development prior to the introduction of the project. Thus, the lower the level of development, the higher the leakage to surrounding regions. However, as a certain threshold level of scale economies and agglomeration is achieved, the lower will be the need for the importation of services and hence, the stronger the effect of the project and associated developments on the region.

In the forthcoming chapter we propose to focus on one segment of a region's development scheme: the forces that determine the location of manufacturing.

3.0 Industrial Location Analysis

The overview of the effects of water resources development on regional economic activities presented in the previous chapter was intended to provide a general understanding of the dynamics of regional growth precipitated by the change in a region's input-output accesses, in our case, investments in a water navigation project. Using this overview as a frame of reference we now move to develop a theoretical framework by which the location of manufacturing can be analyzed. This theoretical framework should provide the basis for an understanding of the factors that determine the spatial distribution of manufacturing in general and the locational decision of the individual firm, in particular.

3.1 The General Theory

In general terms, the multitude of locational factors that influence the location decision of the firm, including labor, raw materials, markets, transportation, energy, water, etc., can be discussed in a framework of supply and demand where the firm's spatial equilibrium is attained by selecting the site that satisfies profit--maximizing demand-supply conditions. The attractiveness of sites (regions) will change as demand and supply condition change. For example, consider the supply side where the cost of labor and materials vary with distance. A declining labor force may require the "importation" of labor either by offering transportation from other locations or by offering higher wage rates to attract labor. Either case increases the cost of labor, thus reducing the attractiveness of the site. Similarly, on the demand side, since the size of the market is

a function of distance, any changes in the market directly bears on the attractiveness of the location as a plant site.

The analysis of locational optimality is a relatively simple one when the firm uses a single input while selling its product in a single market. In such an event, the theory stipulates that the profit-maximizing firm will locate at the source of raw materials when the product is weight-losing and closer to its market when the product is weight-gaining. The locational analysis becomes more complicated when the process of production requires a multitude of inputs which are purchased in different places where price differentials exist among suppliers. To satisfy profit-maximizing conditions, this situation requires distance-pricing of sources of supplies and markets and the development of supply-demand curves for each location.

In the absence of significant cost differentials among suppliers, transportation and factor cost (labor, energy, etc.) become the determining factor as to the optimum location. And this is the case when locational shifts may be induced by a change in transportation costs. These changes may occur as a result of rate changes or by the introduction of new transportation modes. The introduction of waterway transport, of course, is one example. Obviously, these transportation cost changes may take different forms. Interest here lies primarily with those changes that modify regional rates (as opposed to uniform general changes). These are the type of changes that may come about with the introduction of a waterway system. The rates offered will be such that some users will benefit more than others, thus, in all probability, achieving two effects: (1) increasing the competitive advantage of existing regional firms to compete in wider markets;

(2) making the region more attractive to some industries that heretofore could not effectively operate in the affected area.

To this point, the discussion has focused on the locational decision process of the individual firm. It is clear, however, that firms affect and are affected by other firms of the same industry and other industries. These interrelationships among firms and industries explain, to a great extent, the distribution of economic activities in terms of the benefits the firms derive from locating at established economic centers. This interdependency among firms, and hence, their geographical concentration, or agglomeration, is the cause, and the result, of the benefits that the firm can derive from scale and localization economies. Geographical concentration of industries provide firms with an "instant" market and, thus, the ability to take advantage of scale economies. At the same time, this concentration of a variety of industries provides the firm with needed services, a pool of trained labor, transportation facilities, etc.

No discussion of industrial location is complete without mentioning what has become to be known as the "secondary" locational factors. These are the so-called non-economic factors such as community and cultural services, recreation facilities and climate or the "quality of life" factors. It is submitted, however, that these factors, albeit very important, are secondary in the locational decision process in that they may tilt the decision in favor of one location over another only when the availability and cost of the primary factors are equal among the locations considered.

3.2 Determinants of Industrial Location

Having established a general theoretical framework of industrial

location, we now turn to the analysis of specific factors that are influential in determining the location of firms and industries. The general theory of plant location presented above can be restated as follows: for each location, the firm is facing a location-specific cost schedule that determines its production costs at that location and for a given level of output. This cost schedule is determined by the price per unit of input and the quantities purchased. Similarly, the firm faces a location-specific revenue schedule which determines the firm's revenue at that location for a given level of demand. For the profit-maximizing firm, therefore, the problem is to find the location where the spread between costs and revenues are maximized.

What, specifically are the factors that bear on these variables? To best understand the locational behavior of the *individual firm*, some insight must be gained relative to the fundamentals of the determinants of the spatial distribution of manufacturing facilities in general. Thus, it is proposed that the analysis start with some macro considerations of manufacturing activities. The next step should be the consideration of the forces that act upon the concentration of industries in specific geographical areas. And finally, the main concern of this study: location-specific determinants of manufacturing are analyzed.

A. Factors Affecting the Spatial Distribution of Manufacturing

A necessary condition for manufacturing activites to take place is the existence, in some combination, of five primary factors: markets, raw materials, energy sources, labor, and transportation facilities. (Captial, because of its mobility, is not discussed). The availability of these factors provides a screening mechanism for the selection of a broad geographical area, or a region, within which a manufacturing activity can take place. The following is a brief discussion of the nature of these primary factors:

(1) Markets

The existence of markets or accessibility to them is a primary condition for manufacturing to take place. Obviously, there is no unique definition to the meaning of markets for "market areas" and "market targets" vary among firms and among industries. Because of population concentrations, the development of distribution systems and the concentration of industires (agglomeration, to be discussed in this section), in metropolitan areas are commonly accepted as market centers for both consumer and producer goods. Unless otherwise indicated, proximity to markets is usually measured from the point where production activities take place to the nearest SMSA.

(2) Raw Materials

The geographical distribution of raw materials is one of the

major variables explaining the spatial distribution (or concentration) of certain industries. As a general rule, industries using raw materials that lose weight or bulk in the process of production, and industries that use perishables as raw materials are located in close proximity to the raw materials' sources. Examples for such raw materials and industries are various ore processors, lumber and paper mills, canned fruits and vegetables, dairy products, etc. Similarly, industries using outputs of other manufacturing entities but sharing the same raw material characteristics as mentioned above, locate near their source: for example, chemical complexes that are built next to or in close proximity to petroleum refineries.

(3) Energy Sources

Energy sources, in their various forms, vary in the degree of importance as a localizing factor from industry to industry. For most industries that use small or moderate quantities of energy, proximity to the source is only secondary in importance. However, heavy users of energy such as chemical processors, the metallurgical industries and other raw material processors are frequently oriented to locations that possess an abundant supply of energy sources.

An important observation that should be made relative to energy sources as a location factor concerns the current rapid change in relative factor prices with the cost of fuel as a major contributing factor. This phenomenon influenced in recent years the location decision of certain manufacturing in two ways. First, geographical locations which possess energy sources, especially oil and natural gas, have witnessed an influx of energy intensive

industries. Second, locations along navigable waterways have become increasingly desirable plant site locations for energy intensive industries for this mode of transport is especially suitable for inbound shipment of both coal and imported oil.

(4) Labor

Labor as a location factor is discussed in the context of its availability, productivity and cost.

Labor availability in a specific region is a function of the population size, age distribution and the degree of mobility--to and from the region in question. In addition to these basic considerations, labor availability is also analyzed in terms of its sex distribution and skills. While sex distribution--male and female labor force participants--depends upon both demographic and social variables, skill levels distribution of the work force is a function of the quality of schools, the availability of vocational-technical training programs and whether that particular labor force is derived from a predominantly urban-industrial population or from a rural population where industrial jobs supplement earnings derived from agricultural activities.

Labors' productivity depends upon the level of educational attainment of the work force, its training and work ethics, all of which need to be supplemented by industrial organization, management techniques and technology.

Finally, labor's cost, or the wage levels are a function derived from the variables mentioned above. Labor scarcity in general or shortages in workers possessing specific skills will tend to push up wage levels of such workers. Conversely, population

pressure for employment opportunities in rural areas act as a wage level depressant. Given all these variables, the labor aspect of the locational decision process is guided by the specific needs of manufacturing entities with labor intensive industries gravitating to labor surplus--low wage areas. And non-labor intensive industries expanding in, or moving to areas with a skilled and well trained labor force--suburban locations around metropolitan areas.

(5) Transportation

The availability of transportation facilities, alternative modes and freight rates are regarded as major determinants in the location of manufacturing. The best evidence supporting this statement is that almost every transportation center in the country is also a place with significant concentration of manufacturing. The relative importance of transportation services varies among industries. Some generalization can be made, however. Industries that are characterized as processors of low-value raw materials where transportation economies are essential will attempt to utilize low-cost bulk hauling modes--water transportation and rail. On the other end of the spectrum are producers of high value products with relatively small bulk shipments that stress transportation efficiency and speed of service. These industries will tend to use air freight and other specialized services. Between these extremes is the majority of industries that constitute the bulk of commercial shippers. These are the industries that utilize, for most purposes, truck and rail service. For these shippers, both the availability of transport services, access road and local terminals are equally important in their locational choice.

B. Factors Affecting Industrial Concentration

Having discussed the major factors that are basic to manufacturing operations we now move to describe the forces that explain the location of industry, especially as evidenced by concentration of industries in certain locations and the slow but steady shift of manufacturing activities among regions. Miller [8] cites the following factors:

(1) Economies of Scale

Economies of scale are defined as the attainment of a level of production where average cost per unit output is minimized. The attainment of this level is made possible when production facilities are utilized at an optimum; and managerial and marketing efforts and costs, are optimally spread over the largest scale possible. As a location factor, the attainment of scale economies within the firm is affected primarily by the size of markets and their structure, i.e., the ability to sell large output allows efficient production through optimal use of plant and equipment and better use of fixed managerial and marketing efforts.

Equally important location factors that affect the firm's scale economies are forces external to the firm. These external, or agglomeration forces, are factors that bear directly or indirectly on the firm's scale of operations and cost structure. For example, concentration of an industry at a certain location acts as a locational point of attraction to suppliers of that industry. Thus, scale economies attained by the suppliers may allow them to sell their output at a lower cost. Similarly, a geographically concentrated industry using a particular raw material may attract suppliers of that raw material to establish distribution centers in close

geographical proximity thus reducing the cost of materials' procurement that individual firms will have to incur with the absence of specialized supply sources. Similar examples of external economies of scale that are attained at specific locations are the convergence of specialized services to that location, concentration of research facilities to service industries in that location and finally the creation of a trained pool of labor that firms in the industry can draw upon.

(2) Technological Innovations

Technological innovations, manifested by the introduction of new industries, products or processes may alter the location of industry by forcing existing industries to shift to new locations through the establishment of facilities in areas heretofore with no, or very little, industry. An example of such forces in motion is the recent development of techniques by which oil can be extracted from shale rock. Although still in the development stages, a noticeable movement of people and capital to shale rock deposit areas in the Rocky Mountain Region is the beginning of what might become a new industrial center in that part of the country.

(3) Geographic Concentration

Geographic concentration of industry is initiated by the existence of one or a combination of factors that attracts one or a group of industries to locate in a specific area. For example, certain raw material deposits in one area act as a catalyst in attracting specific industries to the region. Agglomeration forces--the attraction of backward and forward-linked industries--follow the initial move to force a coherent industrialized region. The recent shift of manufacturing to the sun-belt region of the country prompted by the

availability of energy sources and labor supplies is a good example of a geographical shift and the formation of new geographical concentations of manufacturing.

(4) Regional Development Policies

Regional development policies, although diminishing in importance as a localization factor, are responsible for, and partially explain, the initial move of industry to various parts of the country.

Although varied in nature and scope, regional development policies are defined, for our purpose, as all action taken by government agencies--Federal, state and local--to promote regional or local industrial development. In practical terms, these policies included a wide range of inducements in the form of grants, tax incentives, training programs, etc. that were offered by regional commissions, state industrial development agencies and local development organizations to attract industry to specific locations. The concentration of industry in previously underdeveloped parts of the country are, at least partially, explained by such inducements. In recent years, however, similar efforts taken by most states lessened competitive advantages that some areas have enjoyed in granting such inducements.

C. Factors Affecting Plant-Site Selection

Finally, we need to analyze those location factors that bear on plant site selection. The discussion of these factors is conducted within the framework established by the findings of empirical studies in which the reasons why specific sites were selected are forwarded by executives responsible for the location decision.

The various location factors can be divided , as Greenhut [2] points out, into three major groups: (1) demand (2) cost (3) personal considerations. Each of these groups include specific factors as follows:

Demand (Market) Factors

1. The shape of the demand curve for a given product
2. The location of competitors
3. The importance of proximity to buyers in terms of service required--type and speed.
4. The need for personal contact between buyer and seller
5. The extent of the market area (also determined by cost factors and pricing policies)

Cost Factors

1. The cost of land
   a. Rent
   b. Taxes on land
   c. Availability of capital and its cost
   d. Insurance (availability of police and fire protection)
   e. Cost of fuel and power
2. The cost of labor and management
   a. Community amenities
   b. Housing facilities
   c. State laws
   d. Unions
3. The cost of materials and equipment
   a. The location of competitors
   b. The price system in the supply area
   c. The extent of the supply area

4. The cost of transportation
    a. The topography, roads, railways
    b. Transport facilities available
    c. The characteristics of products and raw materials

The demand, or market factors are those that determine the firm's location in relation to its market(s). The need for proximity to markets is determined by the industry's structure, size and shape of the market area and the nature of the product. For example, a competitive industrial structure with little price or product differentiations leaves quality and speed of service as the firm's main competitive advantage thus dictating close geographical proximity to customers.

Cost factors as determinants of location are analyzed in terms of factor substitutability. In most instances, the matrix of various production costs are matched against transportation costs to determine the profit maximizing location (market conditions assumed to remain constant). For example, the cost of higher freight charges for some materials are weighted against lower rent costs at a particular location.

In addition to direct production costs, other cost of operations such as local tax structures, and tax incentives are part of the locations specific array of costs that are considered.

Finally, all other factors, sometimes referred to as personal considerations, enter the decision matrix. These include personal affinity of owners or executives to locate in home states, a desire to locate in areas with certain climatic conditions, the availability of recreation and cultural amenities, etc.

3.3 Industrial Location Determinants: The Empirical Evidence

The general theory of industrial location and the stipulated locational determinants of industry are based upon and tested against observed phenomena. In this section we propose to offer some empirical evidence in support of the assertions and observations made previously. This evidence, in the form of studies concerning the location of manufacturing, should serve three purposes: first, it will allow to draw some general conclusions relative to major locational factors that concern manufacturing at present; second, it will present statistical evidence in support of the methodologies used and the conclusions reached by the various studies; and third, it will serve as a prelude to the examination of the various analytical techniques used in industrial location analysis to be presented in the next chapter.

General Plant Location Surveys

A common and widely used method to analyze industrial location determinants is the "empirical-subjective" approach. In this method, decision makers in firms are asked to rank, in order of importance, those locational attributes that were important in attracting the firms to particular locations.

One of the most extensive research projects in the area of industrial location determinants is a survey of manufacturing firms conducted in 1969 for the Economic Development Administration, U.S. Department of Commerce [14]. The purpose of that survey was to assist local agencies to identify and attract those industries with locational requirements compatible with the area's resources. The study surveyed some three thousand firms in industries with above-average growth potentials, asking decision makers in each firm to specify their locational requirements.

Those requirements were categorized as community size and community attributes, plant site size and attributes, and locational objectives to be achieved.

Before specific requirements are summarized, here is a summary of general preferences expressed by the majority of firms surveyed:

-- Geographic Preference: The majority of firms preferred to locate in suburban or non-metropolitan areas.

-- Community Size Preference: The majority of firms preferred to locate in communities no larger than 250,000 population. Over 50 percent preferred a community no larger than 100,000 population.

-- Plant Site Preference: Most firms interviewed preferred a site of 20 acres or less.

-- Labor Force: Most of the firms in the sample employed more than 100 employees.

Tables 1, 2 and 3 provide a summary of community attributes, plant site features and locational objectives, respectively, as indicated by a sample of 2616 usable questionnaires.

Special attention is called to those locational factors rated "A" and "B" where the former indicates a critically important factor without which a community will not be considered and the latter indicates a very significant factor.

A summary of the various attributes shows the availability of the following as the primary factors in each category:

-- Community Attributes:

1. Fire protection
2. Contract trucking
3. Police protection

4. Pool of trained workers

5. Pool of unskilled workers

-- Plant Site Features:

1. Highway access

2. Natural gas service

3. Scheduled rail service

4. Industrial water supply

5. Plant site size

-- Locational Objectives:

1. Market considerations (proximity to existing or ability to serve new markets)

2. Improvement in transportation efficiency and economy

3. Labor force considerations

4. Proximity to raw materials or suppliers

5. Availability of land

TABLE 1

Ranking of Community Attributes in Plant Location

	A*(%)	B(%)	C(%)	D(%)
(1) Air passenger service.	11	17	36	33
(2) Local industrial bonds	3	14	23	55
(3) Vocational training facilities	2	22	42	30
(4) Higher educational facilities.	1	14	41	39
(5) Tax incentives or tax holidays	8	38	32	19
(6) Fire protection.	43	30	20	3
(7) Contract trucking.	30	28	21	16
(8) Public warehousing	1	5	17	73
(9) Public refrigerated warehousing.	0	0	2	93
(10) Police protection.	28	27	37	5
(11) Local industrial development group	3	15	42	37
(12) Pool of trained workers.	18	35	35	9
(13) Pool of unskilled workers.	17	29	35	15
(14) Lenient industrial zoning.	6	23	49	19
(15) Strict industrial zoning	3	14	45	34
(16) Community population, as preferred in Item III	5	26	52	12

* A) of critical value; B) of significant value; C) of value; D) of minimal value

TABLE 2

Ranking of Plant Site Features

	A*(%)	B(%)	C(%)	D(%)
(1) Highway access (within 30 minutes of major highway interchange)	37	39	17	3
(2) Scheduled air freight service.	12	25	31	28
(3) Water transportation	3	5	9	79
(4) Scheduled rail service	23	17	22	34
(5) Piggy back facilities (rail)	5	12	25	54
(6) Industrial water supply (processed).	23	22	29	22
(7) Industrial water supply (raw).	16	17	27	35
(8) Natural gas service.	31	27	25	13
(9) Industrial sewage processing	20	26	32	18
(10) Solid waste disposal	17	25	35	20
(11) Soil load-bearing capabilities	14	22	35	24
(12) Plant site size, as preferred in Item IV	23	39	30	5

* (Rating scale same as Table 1)

TABLE 3

Locational Objectives in Site Selection

	Percent of firms*
(1) Improvement in transportation efficiency or economy	45
(2) Availability of larger parcel of land	25
(3) Closer proximity to resources and/or major suppliers.	31
(4) Closer proximity to other plants of your company.	11
(5) Closer proximity to your distributors and/or customers.	49
(6) Closer proximity to other firms in same or related industries.	2
(7) Ability to serve new and/or expanded markets.	59
(8) Minimize competition from other plants for labor force.	33
(9) To secure factors of location unique to your industry (special energy requirements, etc.)	10

* (Percentage of firms selecting item. Respondent could select as many as three objectives.)

Water Transportation as a Location Factor

Since one of the main concerns of this study is the relationship between water navigation projects and their effect on industrial location, we isolated these industries in the sample that specified waterway transportation as an important location factor (rating of "A" or "B"). The list of industries identified includes:

SIC	Product
24	Wood products
26	Paper
27	Printing
28	Chemicals and allied products
29	Petroleum and coal products
33	Primary metals
34	Fabricated metals
35	Machinery
37	Transportation equipment

Before analyzing the locational factors mentioned by firms as significant in their locational decision, it is interesting to analyze the major production characteristics of these firms for these characteristics will determine the transportation needs.* Not surprisingly, the firms that stressed the importance of waterway transportation in their locational decision share some very distinct common characteristics. The most significant of these are the following:

1. Inputs--The inputs used in the process of production by most firms are either raw natural resources (e.g., wood, petroleum, iron ore, and coal) or basic raw materials (e.g., basic chemicals, paper, iron, and steel--bars, sheets, etc.). These inputs are bulky, heavy, require special loading and unloading facilities, and lend themselves to carload or bargeload shipments.

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* Industry characteristics are provided by U.S. Department of Commerce, Economic Development Administration: Manufacturing Plant Characteristics, 1970 [13].

2. Output--Basically, the "transportability" characteristics of these firms' output is quite similar to their input characteristics; i.e., it is bulky, heavy, and requires special loading facilities. Like the material inputs, these firms' final product lend themselves to tanker shipments (chemicals) and carload and bargeload shipments of lumber, paper, and fabricated metals.

3. Production processes--Although the production processes of the list of industries are quite diverse, there is one major common denominator to most of these industries--the need for large quantitites of water, mainly for cooling purposes. As a matter of fact, the paper, chemicals, petroleum, and primary metal-producing industries account for approximately 85 percent of water used by industry. As will be seen later, some of these industries state a dual purpose in locating along waterways: to enjoy the availability of water transportation and an abundant supply of water to be used in the production process.

The summary of locational requirements is presented in Table 4. These common characteristics emerge:

1. Plant site features--All of the industries listed require industrial water supply. Most of them stress the importance of good connections to at least one additional mode of transport to supplement waterway transportation.

2. Community attributes--The main concern of most of these industries is a pool of workers, skilled and/or unskilled.

3. Locational objectives--There is some ambiguity as to the statement concerning the locational objectives to be achieved. However, it seems that the overriding goal of firms in these industries is to achieve maximum transportation efficiency in both in-bound shipment of raw

materials and delivery to markets of finished products. Not surprisingly, we find about half of the firms in the survey stressing proximity to raw materials and the rest stressing the ability to serve new markets as a major locational objective.

TABLE 4

SUMMARY OF MAJOR REQUIREMENTS FOR INDUSTRIES SPECIFYING WATER TRANSPORT AS AN IMPORTANT LOCATION FACTOR

SIC	Major Plant Site Features	Community Attributes	Location Objectives
(1)	(2)	(3)	(4)
243--Plywood	Rail service Industrial sewage processing	Pool of trained workers	Close proximity to resources
262--Unbleached kraft paper	Rail service Industrial water supply	Pool of trained workers Vocation training	Close proximity to resources
275--Commercial printing	Industrial water supply Solid waste disposal	Pool of unskilled workers	Improvement in transportation efficiency and economy Ability to serve new markets
281--Coal tar intermediates	Rail service Industrial water supply	Tax incentives Contract trucking Pool of trained workers	Proximity to resources Ability to serve new markets
291--Liquified industrial bases (for feed stock and other uses)	Industrial water supply Rail service Solid waste disposal	Vocational training Higher education facilities Tax incentives	Close to resources Ability to serve new markets

TABLE 4 (Continued)

SIC	Major Plant Site Features	Community Attributes	Location Objectives
(1)	(2)	(3)	(4)
332--Cast iron pressure/ pipe & fittings	Natural gas service Rail service Industrial water supply Industrial sewage processing	Tax incentives Pool of trained workers Vocational training	Improvement in transportation efficiency and economy Ability to serve new markets
344--Fabricated structural iron & steel	Industrial water supply	Tax incentives Pool of skilled workers	Ability to serve new markets Improvement in transportation efficiency and economy
354--Rolling-mile machinery	Highway access Industrial sewage processing	Vocational training Higher education facilities Tax incentives	Improvement in transportation efficiency and economy
373--Inbound motor boats	Highway access Natural gas Industrial sewage and waste disposal	Trained & untrained workers Tax incentives	Closer proximity to markets

SOURCE: U.S. Department of Commerce, 1973 [14].

Regional Plant Location Survey: The McClellan-Kerr Navigation Project

In order to assess the impact of the McClellan-Kerr Navigation system on industrial location in a tier of counties adjacent to the river in Arkansas and Oklahoma, an IWR report [16] presents the results of a survey of firms that either located or expanded operations in the Arkansas Waterway area. Somewhat similar to the survey methodology utilized in the national study reported above [14], firms in the Arkansas and Oklahome portions of the waterway were asked to rank locational factors that were conducive in attracting them to their respective sites.

A follow-up to this 1975 survey was conducted in 1979 [17]. The recent survey, conducted among a sample of 213 firms that located or expanded operations since the waterway became operational was similar to the 1975 survey in that it covered the same geographical area and that it restricted itself to the same locational factors that firms were asked to consider in 1975.

Not surprisingly, the six most important factors that were mentioned in 1975 were repeated by firms' executives in 1979. Similarly, the same percentage of firms (17) indicated, in both surveys, the importance of access to water transportation in their locational choice.

Of some interest is the relative shift in locational priorities that occurred between 1975 and 1979. This is especially manifested in the greater emphasis placed on proximity to markets in the latter survey and the relative decline in the importance of land cost as a locational determinant.

Finally, when the results obtained in these surveys are compared to the national survey conducted in 1970 [14], the universality of industrial locational determinants must be recognized. In the three surveys--

one conducted among firms across the nation and the other two in a relatively small region on the Oklahoma-Arkansas border--market consideration, labor cost and availability, proximity to raw materials and land availability and its cost seem to be the most prominent factors that determine the location of industry.

Table 5 presents the ranking of the six most important factors of location as determined in two surveys in Oklahoma. (For the comparison with the national survey's results see page 26 under the heading "Locational Objectives.")

TABLE 5

FACTORS AFFECTING LOCATION AND EXPANSION OF MANUFACTURING PLANTS IN SELECTED COUNTIES, ARKANSAS WATERWAY AREA, 1975 and 1979

Factor	Percentage of Plants Indicating Importance	
	1975	1979
Availability of labor	51	48
Labor costs	47	31
Accessibility to markets	45	54
Land costs	43	27
Accessibility of raw materials	41	30
Personal preference of management	40	40

SOURCE: U.S. Corps of Engineers, Southwest Division 1977, published by IWR [16].

U.S. Corps of Engineers, Tulsa District, 1979 [17].

3.4 Corroborating the Findings of Survey Studies

A major issue concerning survey studies as a tool for analyzing the factors that determine the location of manufacturing is whether answers provided by firms' executives reflect popular opinions only or whether indeed such opinions are also followed by action. In this section we propose to summarize the findings of studies that were designed to test whether firms' expected locational behavior corresponds to actual location choices.

Case Study 1

Addressing itself to the very same question posed above, an IWR study [15] has followed a unique approach in investigating the issue of "comment vs. action" in the location choice of the chemical industry.

Comments made by chemical plants' executives concerning the relative importance of various locational factors are gathered annually by "Chemical Week" [12]. These comments are summarized in Table 6 below. Focusing on one factor--transportation--the IWR study attempted to ascertain the extent at which this factor indeed influenced the location decision of chemical plants. To accomplish this, the IWR study investigated the geographical distribution of new plants and plant expansion provided by Industrial Development magazine in 1972.

Reported new plants and plant expansions were divided into a water-intensive group and a control group of non-water using industries. The next step involved the determination of communities nearest the site of the proposed new or expanded plants with communities being classified as to whether or not they were located near or on a navigable waterway, river or lake.

TABLE 6

LOCATION FACTORS IDENTIFIED BY ANNUAL CHEMICAL WEEK SURVEY, SELECTED YEARS

Factor	Comments
Transportation	1971--"single most important factor" 1972--"pushed into the background" 1973--"taking new significance...(due to) the energy crisis" 1978--"transportation's often-dominant role... has been the result of its cost (5-10% of sales) and the necessity of quality service. Both factors are still very much in evidence."
Energy	1971--"a top factor in site selection" 1972--"single most important element in chemical plant location" 1978--"because chemical producers are the second-largest consumers of industrial power, energy is always of prime concern."
Water	1971--"regional variations in pollution control are no longer an attraction" 1972--"Cooling water availability the primary water issue" 1973--"renewed interest in water availability" (due to tougher pollution control) 1978--"in time...groundwater problems may have greater impact on site selection than air quality" (due to various water acts and state implementation plans)
Labor	1973--"construction labor scarce" 1978--"labor is a factor of at least moderate importance in the site-selection process"
Taxes and incentives	1973--"medium significance"; "in startling resurgence of industrial land issues" for pollution control investments 1978--"industrial development land...will grow in utility"; "some industrial development specialists hold that incentives have (been) growing in significance to big investors"

SOURCE: Chemical Week, 1978. [12]

Out of 31 new plants and 43 expansions reported, 24 and 40 plants respectively, were located in or nearby communities situated along navigable waterways. A close examination of the data reveals that those plants which chose to locate on navigable waterways were dominated by chemical plants and refineries. These plants accounted for 18 out of 24 new plants and 23 of the 40 expansions. These findings, when coupled with the findings of the various survey studies, corroborate that indeed, in the majority of cases, expected and expressed locational behavior closely correlates with actual choice of plant sites.

Case Study 11

Reacting to "...recent research that has questioned the usefulness of location theory as an explanation of spatial distribution of manufacturing..." Logan (6) attempts to discuss the following questions: (1) what are the variables considered by entrepreneurs in making locational decisions; (2) to what extent does the distribution of industry correlate with the factors that individual firms list as being important (in the locational choice) and (3) what are the distinguishable characteristics of those firms located at sites that are not in accord with the occurrence of the factors most firms claim to be important.

The answer to the first question was provided through a survey conducted in a sample of 446 manufacturing firms that established operations in the State of Wisconsin between 1962 and 1967. Locational factors that were ranked as most important in selecting Wisconsin as plant location were:

1. Markets (consumer and industrial)
2. Home area, personal reasons
3. Labor availability

4. Land and buildings availability

5. Raw materials

To determine whether firms chose locations in accordance with stated preferences, a regression model was developed to test the hypothesis that locations are chosen on the basis of factors' availability, as stated above. The quantification of these factors was accomplished through the use of surrogate variables. The resulting model included six dependent variables that measured either the number of new firms or the number of jobs created and eight independent variables representing the reasons given by firms relative to their locational choice. For example, market considerations were represented through the use of a market accessibility index. The surrogates for labor were percentage net migration, number of unemployed, percentage of unemployed, etc.

The results of the regression analysis demonstrate that, with the exception of branch plants, "...not only to entrepreneurs consider economic forces (in the choce of location), but they can select locations where these forces may be optimized." (6)

For our purposed, this conclusion is also an endorsement of the assertions made in location theory, and the methods of analysis used, as valid and reliable tools in evaluating and analyzing the location of industry, in explaining existing locations and in predicting future ones. With this observation in mind, we now turn to the analysis and evaluation of specific industrial location analysis techniques.

4.0 A Survey of Industrial Location Analysis Techniques

As has been stated previously, the purpose of this study is to adopt industrial location analysis as an analytical tool in the determination of regions' comparative advantages for the location of industry. This determination can then be used as an input in the evaluation of economic benefits associated with the development of water projects in general and navigation projects in particular.

Consistent with this purpose, this chapter describes the various methods and techniques that are being used in analyzing industrial locations. Since there are a number of adequate summaries of these techniques (see Isard [3]), no attempt will be made here to present an exhaustive and detailed treatment of all possible techniques. Instead, for those techniques that seem most applicable for the purpose at hand, a brief outline will be presented and theiradvantages and limitations pointed out.

Some of the most prominent techniques--linear programming, input-output analysis and econometric modeling are discussed elsewhere.* Four equally important techniques are analyzed here. They are comparative cost analysis, industrial complex analysis, correlation and regression analysis,and survey studies.

4.1 Comparative Cost Analysis

To determine the firm's least-cost location, comparative cost analysis focuses on plants' locational costs at various sites. In a theoretical sense, the number of locations that could be considered is unlimited. However, in reality the number of locations that are actually

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* The adaptation of these techniques for benefit assessment of water navigation projects is currently being undertaken by IWR. At the time of writing this report, no publication date has been set.

evaluated is reduced to a manageable number because of the firm's predefined market area and because of the existing geographical distribution of raw materials. For example, a decision to penetrate southwestern markets will, in all likelihood, restrict the search for plant location to a five or six state area. Similarly, firms in the lumber and paper industries will seek locations that are in close geographical proximity to forest and abundant water supply areas.

Thus, given these constraints, comparative cost analysis enables the investigator to determine the location in which the firm, or the industry, will operate at the lowest cost, for a given output, where cost of operations are defined as production and distribution costs.

The procedure of conducting a comparative cost study is relatively simple and straight forward. In principle, the analysis requires sufficient data to calculate total production costs for the firm (industry) in each location. And the location that offers the lowest production costs (including transportation charges) should, other things being equal, be selected. However, since the concern is with <u>total cost</u> differentials, and since some costs do not vary among locations, the task is reduced to the analysis of those production and transportation cost elements that differ among locations. Essentially then, comparative cost analysis is a procedure by which locations' <u>comparative advantages</u> are determined for individual firms or industries.

The main limitation of comparative cost analysis as a tool to investigate the location of firms lies with its underlying assumption that both markets and price-cost structures are given. As long as the analysis is confined to one firm (or a small industry) this assumption might be accepted. However, when more than one firm is considered, the

effect of these firms on local markets (demand) and price-cost structures should be carefully evaluated. This evaluation, however, could be done more efficiently with other analytical techniques (input-output analysis, for example) and therefore, comparative cost analysis should be limited to the investigation of individual firms. Another draw back of this technique is that it does not provide for the evaluation of interindustry relationship effects, i.e., the secondary and tertiary effects of a change in one industry's (or firm's) activity on other firms or industries. To overcome this drawback, industrial complex analysis was developed. This technique is discussed below.

4.2 Industrial Complex Analysis

The limitations of comparative cost analysis as a "one industry analysis" technique on one hand, and the generalities generated by inter-regional input-output analyses, on the other hand, have prompted the development of a hybrid analytical tool. This tool, industrial complex analysis, gives cognizance to economies of scale, localization economies and regional price variations unaccounted for in input-output analysis; and at the same time it recognizes the interindustry relationships that are ignored by comparative cost techniques. As the name implies, industrial complex analysis analyzes the location of industrial activities in the context of a "set of activities occurring at a given location and belonging to a group (subsystem) of activities which are subject to important production, marketing, or other interrelations" [3, page 377].

To determine the type of industrial activities that can be accommodated by a region, given its resources, industrial complex analysis starts with an initial survey of a region's resources. This survey will

reveal certain initial advantages and limitations that the region possesses for the development of manufacturing activities. This initial survey provides the basis for the investigation of various industrial complexes. Once such potential complexes are identified, the next step requires the construction of input-output tables indicating the various inputs and outputs associated with the various processes. In this manner, certain complexes for which required inputs are unavailable and/or outputs that cannot be economically marketed, are eliminated. This process of elimination provides the investigator with a small number of potential complexes that are deemed feasible and for which comparative costs analysis is warranted. Assuming certain market configuration, the analysis of costs proceeds along typical comparative cost procedures, i.e., regional differentials in the cost of transportation, labor, power, fuel, etc. are evaluated. The end result of this analysis is quite similar to the results obtained from a single-industry comparative cost analysis--the pros and cons for two or more locations for identical complexes. The second step, therefore, expands the analysis to include variable factor proportions and product mixes, and processes substitution. Finally, the effects of agglomeration economies--scale economies--localization and urbanization are evaluated in terms of their influences on complex feasibility at the various locations.

Obviously, the quantification of some of these elements requires brave assumptions relative to the behavior of factor and product markets. For example, how will the wage rates for a given skill be affected when the demand for such skills is increased by a specified number with the introduction of a new industrial complex in the region?

These difficulties notwithstanding, estimates relative to the probable effects of the aforementioned spatial economies point out probable problem areas that may merit further investigation.

To sum up, the main application of industrial complex analysis is in the analysis of resource use, industrial location and general directions of regional development. Its main advantage lies with the ability to identify and evaluate profitable situations and activity combination that cannot be properly evaluated with the use of either comparative cost techniques or with generalized input-output analyses. Yet, because of some of its limitations, industrial complex analysis is best utilized when used as a complement to other techniques.

For a discussion of case studies in the application of comparative cost techniques, industrial complex analysis and a synthesis of the use of these techniques in conjunction with other techniques, the reader is referred to Isard [3].

4.3 Correlation and Regression Analysis

In a major study using regression analysis to explain the location of various manufacturing activities, the rationale for using this technique is stated as follows:

> "Multiple regression can explain location patterns that result from the location decisions of individual owners and managers when these decisions are economically rational and are based upon past experience and knowledge of existing area characteristics. Regression can also explain location patterns that are created by a process of differential economic success. For example, if economic success is awarded to electronic plants that locate near universities, a close correlation of growth in electronics

> employment with distribution of universities may result either from the actual decisions made by entrepreneurs to locate their plants near universities or by a process of differential success in which plants so located expand while plants located elsewhere fail to expand. [Spiegelman, 11]

The essence of the statement quoted above is that the location of industry can be explained as a function of a set of measurable variables, or stated differently, those location factors that were mentioned throughout this study, if quantifiable, can explain, statistically, the location of industry. The last statement also brings to the fore the limitations of regression analysis. First, for a regression model to be statistically significant, reliable data are necessary. Furthermore, some of the data, because of problems of quantification, may be replaced by surrogates of questionable validity. And thirdly, the nature of the analysis requires cross-sectional data, or, a set of measurements at a point in time. Obviously, ignoring the dynamics of change in both industrys' requirements and areas' factor endowments as they change over time, limits to a certain extent the use of regression models as predictive tools for industrial location.

Miller [8] summarizes the mechanics of the application of regression analysis to industrial location.

> The Stepwise Approach--The stepwise approach begins with the identification of a relatively large set of independent variables, or, those variables that affect the location of the industry in question. In some studies the number of stipulated independent variables can be as high as 130 variables [Dorf, 1]. The number of variables is reduced by a process of elimination. This is accomplished through an initial two-variable regression analysis where the variables with the lowest correlation with the dependent

variable are eliminated. Thus, the independent variables that have the highest partial correlation are included in the second step. The new regression equation with two independent variables is now derived and the partial correlation is computed for the remaining variables while the first two are held constant. In each successive step, the partial regression coefficients and multiple regression coefficient are obtained. This procedure is followed to the point where the addition of more variables does not significantly help to explain the dependent variable, or, the factor of localization. The second approach utilizes the same multiple regression analysis. However, it is applied in cases where the number of independent, or explanatory variables, is small. In this method, a functional relationship between the dependent and independent variables is hypothesized and then statistically tested to accept or reject the hypothesis.

Some of the limitations of regression models in explaining the location of industry have been discussed above. Other problems are more technical in nature and are concerned mostly with problems of estimations, three of which are of concern--spurious correlation, multicollinearity and the identification problems. A discussion of these statistical problems are beyond the scope of this study. The reader, however, should be aware of the existence of such problems in statistical estimations.

The main advantage of regression analysis in the evaluation of industrial location lies with the ability that this technique renders to isolate from a large mass of data information that is pertinent to the problem on hand, i.e., to isolate and statistically estimate those factors that bear on, and are significant in explaining the location of industry. Furthermore, this technique allows the investigator to

make such determination relative to manufacturing activities in general or to specific industries, performing the analysis in broad geographical regions or in narrow well-defined subregions or any other small areas with data availability being the only constraint to the performance, and quality of the analysis.

4.4 Survey Studies

One of the most commonly used analytical techniques in the investigation of industrial location is the survey, or questionnaire study. Essentially, a survey study attempts to determine the factors that attracted manufacturing entities to a specific location where manufacturing entities are defined as a group of firms belonging to the same industry or a group of firms representing a cross section of a large number of industries. Similarly, the geographical location in question could be as small as a group of counties or that encompass an entire state, or a region that includes a number of states.

These variations in the composition of the observed samples and geographical areas notwithstanding, the data generated by survey studies is quite uniform: a list and ranking of factors that influence the various firms in the sample to locate in their respective sites. Although not always thus specified, the locational factors are usually categorized into three major groups:

(1) Overall Locational Strategy Factors

These factors pertain to the firm's overall location strategy. As such, location determinants in this group are those that determine whether the firm is market or raw materials oriented (or neither); the firm's desire to secure an uninterrupted supply of a certain input

(for example, energy sources), whether or not the firm is willing to accept a unionized labor force, etc.

(2) Cost Factors

The second set of data generated by questionnaire studies pertains to firms' cost factors. These location factors are those that bear on the firm's cost of operations--production and distribution costs--which the assumed profit maximizing firm is trying to minimize. They include labor, power, transportation, cost of land, taxes, etc.

(3) Amenity Factors

Finally, the last group of location factors are those that can be categorized as amenity factors. These are mainly community and environmental attributes that are especially important in the locational decision of foot-loose industries. The availability of schools, hospitals, cultural activities and recreational facilities fall in this category.

What are the advantages and limitations of survey studies? The comparative costs and industrial complexes analyses previously discussed are basically an input and market location study of an industry for the purpose of determining the location that minimizes the cost of manufacturing and distribution. Thus, when markets are predetermined and resources inputs are available in specific locations, transportation charges become the factor upon which the choice of sit is determined. For many industries, however, major inputs are available in many alternative locations and transport cost differentials are not a dominant location factor. Thus, after certain locations are ruled out because either cost or market conditions are unacceptable, there remains a relatively large number of alternative locations that should be considered. The selection of the ultimate site will be determined, therefore, on the basis of location

attributes(s)other than a set of major market or cost considerations. The ability to consider and evaluate the influence of such location factors on the location decision of the firm is the main advantage offered by the survey study. Another advantage of this technique is the ability to analyze the locational preference of a large number of industries on the basis of a single survey study. This is so because many industries, although differently classified, share similar operational characteristics, i.e., they require similar factor inputs and they distribute their product in the same markets. Locational preferences of such industries are, therefore, similar. The ability to make such deductions, obviously, depends on the size of the sample surveyed.

The major weakness of survey studies is the qualitative rather than quantitative data that they provide. Their use, therefore, should be restricted to investigations that require generalized answers only. More specifically, survey studies should be used as an initial screening mechanism that, if needed, can be supplemented with quantitative methods.

4.5 Evaluation of the Analytical Techniques

In this chapter we presented four techniques that are commonly used in analyzing industrial locations. The first two techniques--comparative costs and industrial complex analysis--are used to systematically analyze the operational characteristics of single, or small groups of industries, and areas' locational attributes to determine the profit-maximizing location for these manufacturing activities.

The last two techniques described in the previous chapter were regression analysis and survey studies. As opposed to the first two techniques, which are industry-specific, the latter two analytical tools are area-specific. In other words, the comparative cost approaches first

determine industrys' requirements and then seek a location in which these requirements can best be met. The survey studies, on the other hand, determine areas' location attributes (as defined by firms that located there) and thus, make it possible to predict which industries can successfully operate in the area, given industrys' locational requirements and the area's locational attributes.

In essence, then, all of these techniques accomplish the same end albeit through different routes--the determination of areas' locational advantages for manufacturing activities.

The basic difference between these two groups of location analysis techniques is manifested in their application. Comparative cost approaches are designed to analyze individual industries or small complexes; survey studies may at times encompass the entire spectrum of manufacturing activities; comparative cost studies analyze a number of probable locations to finally arrive at one optimum location; survey studies analyze one location to determine the group of industries that can operate in that location profitably.

It seems, therefore, that for our purpose--the determination of areas' comparative advantages for the operation of manufacturing--the preferable technique of analysis is the survey study approach. The main reason being the ability to analyze in-depth an area's location attributes and then, for that area, to screen a large number of industries to determine those that might find it a suitable location to operate in.

5.0 The ILS Model

In the last chapter we described and analyzed a number of techniques used in industrial location analysis. Of the techniques analyzed, one--the survey study approach--seems to offer the best possibilities as a screening mechanism for the determination of areas' comparative advantages for the location of industry.

In this chapter we propose to present and analyze a survey study and an industrial location model derived from it, that should be considered for adaptation for Corps of Engineers purposes. The model, The Industrial Location Service (ILS) was developed by the Economic Development Administration, U.S. Department of Commerce. We shall first describe the model and analyze its capabilities and then examine its applicability as a tool of analysis in the determination of industrial location benefits induced by water development and water navigation projects.

5.1 Model Description

The Industrial Location Service (ILS) is a computerized system designed to match industries with specific geographical areas through a screening process that identifies those industries which can best operate in an area, given the specific industry's locational requirements and the area's locational attributes.

Two purposes guided the development of ILS. First, many designated Economic Development Administration (EDA) assistance areas around the country consist of small, little known towns and cities which, it was felt, were often overlooked by industry or professional plant location firms as potential plant sites. In many instances, however, these towns and cities possess many of the location requirements for successful industrial operations. Thus, the first purpose of ILS was to develop a

mechanism by which plant site seeekers can evaluate, at a very lost cost, a large number of towns that were heretofore very seldom considered as potential plant sites.

Since the system is designed with dual capabilities--to evaluate a number of sites in terms of a single industry's locational needs and to determine the various industries that will find sufficient locational factors to satisfy their needs in a specific community--the second purpose of ILS is to assist local planners and Industrial Development agencies in the identification of those industries most likely to find their area attractive and thus, help in narrowing down "target" industries upon which the community can focus in its efforts to attract manufacturing.

Another aspect related to this purpose is the ILS' additional use as a tool of analysis in a community's planning efforts. While the availability of many productive factors and location attributes are beyond the community's control (raw materials, distance to markets, etc.), other location factors can be considered as decision variables that can be affected by the community. Building access roads, vocational schools, waste treatment facilities are only a few examples of the manner by which a community could enhance its attractiveness as a location for industry in general or to accommodate the needs of a specific firm that would locate in the community if certain factors were to become available.

5.2 Model Components

The ILS Model consists of two major files:

-- Location requirements of industry

-- Communities' profile

a. Industrial Location Requirement:

The file containing the industrial location requirements was

compiled from a special survey conducted in 1971 by the Bureau of the Census of 250 5-digit SIC industry groups that showed the highest rates of expansion during the 1960s and the greatest potential for growth in the 1970s. Within these groups, plants were selected on the basis of the following criteria: (1) they were primarily engaged in the production of growth product classes (represented by 50% or more of the total value of shipments of the plant) and (2) had employed at least 100 employees [14].

Since industrial plants currently in operation reflect location decisions that were made in previous years, data pertaining to sites, locations, and plant characteristics of these plants might be inadequate, or unreliable in identifying locational requirements in current decisions to locate or expand new operations and facilities.

To overcome this problem and to provide a means by which current and historic locational requirements can be distinguished, two report forms were developed for the survey.

To identify the location and operating characteristics of plants in operation in 1970, participants were requested to provide data or manufacturing plant characteristics (see Appendix A). Firms contemplating expansion or construction of new facilities during 1971-1975 were requested to provide industrial location determinants (see Appendix B). This provided a sample of 5,500 entities in operation in 1970 of which 3,800 were identified for inclusion in the report of industrial location determinants. Actual tabulation of usable questionnaires for this report amounted to 2,656, or 70 percent of firms contacted.

The range of data obtained for each industry group relative to its locational requirements are provided in Appendix B. The following is a brief summary of data provided by each firm:

General Information--

-- firm's plans to establish new plants or expand operations

-- type of location preferenced for new plant

-- community size preferred

-- size of plant size preferred

-- planned number of employees in new plant

Ranking of Community Attributes--

Firms were asked to rank as "critical" (location not considered in absence of factor), "very significant," "average," "less significant" and "minimal factor" 16 community attributes. These attributes can be categorized as:

-- transportation services

-- education and vocational training

-- taxes and public financing

-- community services (fire, police Dept.)

-- labor availability

Ranking of Plant Site Features--

Firms were asked to rank, as mentioned above, the importance of plant site features that were categorized as follows:

-- transportation accesses

-- water supplies

-- power supplies

-- waste disposal facilities

Locational Objectives to be Achieved in New Site--

Firms were asked to identify the three most important locational objectives that the firm hoped to achieve with the new location/expansion. These included:

-- market objectives

-- raw materials objectives

-- agglomeration objectives

b. Community Profiles:

The file of community profiles contains at this point the profile of communities designated by EDA criteria as "growth centers," areas of former military bases and Indian reservations. However, this file is open-ended in that it can be expanded to include any community for which pertinent data are available. Similarly, the file is designed to accept aggregated data for two or more communities, thus turning the analysis from a community to area-specific. In this case, industries are matched with areas (counties, multi-town areas, etc.) rather than with single communities.

The data required for a complete community profile is presented in Appendix C. The following is a summary of the major data categories that constitute a complete profile:

-- general and demographic data

-- market information

distance and size of nearest SMSA

-- transportation information

various modes and highways

-- community industrial base

employment by industry

-- mineral and agricultural resources

-- general resources

industrial parks

utilities

(--general resources)

power

water

-- labor data

labor availability

wage rates

vocational training

-- community services

-- financial incentives

5.3 Application of the ILS Model

The entire ILS system consists of industries' locational requirements file, a file in which community profiles are entered and a computer program--a match generator--designed to match industries requirements with communities' resources.

Since the main objective of the model is to determine the community's comparative advantage for the operations of specific industries, the model is designed to isolate those locational requirements that characterize an industry's locational needs. Thus, before the industry's locational needs are matched with a community profile, its set of location requirements is reduced to include only those factors that meet the following criteria:

(1) at least 50 percent of the firm in that industry's sample listed the factor as a requirement, or,

(2) that the percent of firms in that industry's sample listing a factor is at least two times greater than the percent of firms in all industries surveyed that listed that factor as a requirement.

In this manner, the model reduces the number of locational requirements of each industry to a set of factors that distinguishes that industry's locational preferences from all other industries.

Now that an industry's most distinguishable set of locational requirements has been determined, the next step is to determine the relative importance of each locational requirement within that set. For this purpose a system of weights for each locational factor was developed. Two variables determine the weight assigned to a particular location requirement:

(1) Its importance rating, whether rated critical, significant or average value; in those cases where no importance rating was assigned to a requirement, it was considered as average in importance

(2) The percentage of firms in that industry's sample that listed that requirement

Table 7 lists this weighting system. Column 1 classifies the percentage of firms listing a requirement and Column 2 shows the point score on the basis of the relative importance assigned to the requirement by the firms in the sample.

TABLE 7

Scoring System for Location Requirements

Percent of Firms Listing the Requirement	Importance Rating Score			
%	1	2	3	4
90 - 100	100	70	58	58
80 - 89	97	67	55	55
70 - 79	94	64	52	52
60 - 69	91	61	49	49
50 - 59	88	58	46	46
40 - 49	85	55	43	43
30 - 39	82	52	40	40
20 - 29	79	49	37	37
10 - 19	76	46	34	34
0 - 9	73	43	31	31

On the basis of this scoring system, a total score for each industry is determined where the total score is the sum of the weights (point scores) of the set of locational requirements of that industry.

The last step matches the community profile with the industry's locational profile. When a resource available in the community fulfills an industry requirement, it is given the point score assigned to that requirement. The sum of the points received by the community for those requirements it fulfills is the community's point score for that particular industry. This total point score obtained for the community is then calculated as a percentage of total possible point score for the industry. It should be noted that if, for example, a community receives a score of 90 percent, it does not mean that the community fulfills 90 percent of the industry's requirements. Rather, it means that the community obtained this percentage of total possible point score of that industry. In this sense, the score obtained by the community is an indication of the community's relative advantages (over other communities) in fulfilling the locational requirements of an industry.

5.4 Model Output and Interpretation

Appendices "D" and "E" demonstrate the output generated by the ILS Model. Appendix D shows the output obtained for Muskogee, Oklahoma. For practical purposes, the model lists only those industrial classifications for which Muskogee's locational resources fulfilled at least 70 percent of total score points of the industries listed.

A breakdown of this distribution of industries, aggregated into two digit SIC classification, by point scores obtained, is the following:

TABLE 8

Distribution of Industries by Point Scores

SIC	Description (Industries Classified as Producers of:)	Number of Industries in Score Range			
		90-100	80-89	70-79	Total*
27	Publishing and printing	5	5	5	15
28	Chemicals and allied Prod.	4	6	-	10
33	Primary metals processors	9	5	2	16
34	Fabricated metal products	11	6	2	19
35	Machinery (except electrical)	19	20	11	50
36	Electrical machinery	7	10	6	23
38	Various instruments	4	6	1	11

* Those industries that appear less than six times are omitted.

How should this data be interpreted? For illustrative purposes let's isolate and examine SIC 35. This industrial classification consists of 65 sub-classifications at the 5 digit code. Firms classified in this category manufacture a range of products from engines to farm machinery to machine tools. Although the range of products is quite substantial, firms in these industries share some common requirements relative to their choice of location. These locational requirements include trained workers, vocational training, transportation facilities and a certain community size. Apparently, all these major requirements were available in Muskogee thus rendering it a good location for these industries to operate in.

A simple, yet effective,way to test whether the city's "expected" attractiveness to these industries is matched by actual firms' preferences is to compare the model's "prediction" to actual employment in these industries. For this purpose we propose to compare industries as they were ranked by score points to the rank of actual employment in these industries in Muskogee.

We should mention that the largest manufacturing employers in Muskogee in 1977, as estimated by the Bureau of the Census-County

Business Pattern, were the stone and clay industries and the food industries. Since these industrial classifications are excluded from the ILS model, we shall not include them in our comparison. The relevant industries, as they are ranked by the ILS model and their rank by actual employment size are the following:

TABLE 9

Model Ranking and Actual Employment Ranking
for 7 SIC Groups in Muskogee, Oklahoma

SIC	Industry	Number of Classifications Scoring Between 70 to 100 Percent	Rank	Actual Employment Rank *
35	Machinery (except electrical)	50	1	1
36	Electrical machinery	23	2	5
34	Fabricated Metal Prod.	19	3	2
33	Primary Metals	16	4	3
27	Publishing and printing	11	5	4
38	Instruments	11	5	6
28	Chemical, Allied Prod.	10	6	7

* Rank is by size of employment among manufacturing industries. Employment in stone and clay and food industries, first and second in manufacturing employment in Muskogee, are excluded.

As can be seen in Table 9, with the exception of the electrical machinery industries, "expected" attractiveness of Muskogee to the five other industrial classifications closely matches the rank of actual employment in these industries in that city. For these industries, the hypothesis that statement by firms as to their locational preference is expected to be followed by action is confirmed. And that actual locations selected by these firms do possess the locational requirements stated as important. Similarly, this simple, yet effective, test confirms the model's ability to predict the adaptability of industries to specific

locations thus rendering it an effective tool in determining areas' comparative advantage for the operation of specific industries.*

5.5 Suggested Applications of the ILS Model to Corps of Engineers Projects' Evaluation

As has been stated in the introduction to this study, the determination of water navigation projects' benefits is dependent upon the ability to predict future industrial activities in projects' areas. This, in turn implies an ability to accurately predict the future spatial distribution of manufacturing. Obviously, such predictions are, at best, guesses subject to a wide margin of error, especially when they are made for relatively small geographical areas. However, since these projections are critical in evaluating the benefits, and then, the feasibility of projects, it is the analyst's task to reduce as much as possible the margin of error associated with such predictions.

One way to accomplish this is the provision of analytical tools that will aid in analyzing areas' potential for industrial development. The determination of such potential, or locational advantages, are not by themselves projections of future industrial activities. Rather, they serve as a screening mechanism upon which quantitative projections can be based. More specifically, such tools should offer clues as to which industries might locate in the project area. The quantitative projection methods should supplement it by providing the how much and when information.

The ILS model described above is one such tool that is readily available to be used in the evaluation and determination of water navigation project benefits.

In the following we shall describe the manner by which the ILS

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* For a more rigorous statistical test of a similar nature, see Dorf [1].

model can be incorporated in projects' evaluation procedures. This description will include: (1) suggested guidelines for the identification of the appropriate geographical areas that should be analyzed; (2) identification of the type of data needed and its data sources and (3) suggested applications of model output.

a. Area Delineation

(1) General Impact Area

We define the general impact area as the geographical area that captures the full spatial impact of the project and the ensuing economic activities prompted by it.

Bearing in mind that our analysis is geared to the determination of the project's effect on industrial activities and that such activities are usually conducted within or around established population centers, the determination of the general impact area is significant only in that it provides the general boundaries for the set of cities and towns upon which the analysis should focus.

To determine these boundaries, the following questions should be asked: what is the farthest distance from the waterway that a manufacturing activity can be established and yet enjoy the economies afforded by it? Obviously, those manufacturing entities that desire to maximize the economies provided by the waterway will attempt to locate in the immediate vicinity of the channel, thus minimizing transfer and handling costs. These locations along or in close proximity to the waterway form the first-order tier of sites within the general impact area.

The second question is: what are the most likely locations from which firms located in the first-order tier will draw services and supplies and whose distribution centers will be used as points of departure for regional and national market? As with the first question, no exact answers

can be provided, however, it was previously established that various services, supply centers and distribution facilities usually converge on industrial areas which in turn, are associated with established population centers, usually central cities and standard metropolitan areas. Thus, we propose that the locations of SMSAs nearest the project area will serve as the boundary line for the general impact area.

(2) Specific Impact Area

We define specific impact areas as those cities and towns in which physical facilities will be established or expanded. The reasons for the need to define specific cities and towns are threefold: first, manufacturing facilities are usually established within city limits in order to enjoy city services. Second, defining a point in space should help to determine the area from which local resources can be drawn. For example, the effective labor force supply curve is usually considered to be within a commuting distance--about a 25-mile radius. Similarly, the effective personal and retail services area is that which is covered by local newspapers and radio stations. And finally, we chose to define specific cities and towns because the ILS model is community oriented and most of the data required are community-specific data, the details of which will be discussed presently.

Given these considerations, we propose that the analysis will be confined to a general area surrounding the water navigation project and bounded by nearest SMSAs. And within this general area, the ILS model should be applied to a set of cities and towns that meet the following criteria:

-- they should have a population of at least 5000;

-- they should be focal towns in that they provide services to a larger surrounding area;

-- they should not have a population exceeding 125,000 since the ILS model becomes less discriminating as the city size and its industrial base increases.

b. Data and Data Sources

Data requirements for community profiles are presented in Appendix C. In essence, a community profile is an inventory list of the community's resources: its infrastructure, services provided, labor force and labor force characteristics. This inventory of resources extends, in some instances beyond the community's boundaries. This happens when certain resources are unavailable in the community and, therefore, the distance to the nearest point where such resources are available needs to be known, for example the distance to the nearest rail terminal. Most of the data required can be obtained from the following sources:

-- city administrators
-- local planning agencies
-- local Chambers of Commerce
-- state planning agencies
-- state industrial development departments
-- state employment security commissions
-- U.S. Census publications

c. Model Output Utilization

The output generated by the model is demonstrated in Appendices D and E. Appendix D shows the output obtained by matching the entire industrial file with one community to yield a list of industries that are most compatible with that community's resources. Appendix E demonstrates the output generated by checking the adaptability of a specific industry to a list of communities in the communities' file to yield a list of communities

that are compatible with that industry's location requirements.

Given these capabilities of the model, the output generated by it can be utilized in projects' evaluation in the following ways:

(1) Determination of project area location advantages for the operation of industry:

To provide an overview of the type of industries that can operate in the study area, given resources availability, area community profiles should be matched with the industrial file to yield the list of industries most conducive to operate in the region.

(2) Determination of "with" and "without" project area locational advantages:

For water navigation projects, "with" and "without" project industrial activities can be evaluated for the project area by first generating a list of industries that are likely to locate in the area without the benefits of a navigable waterway. The second step should be the modification of area's community profiles to include the availability of water transportation. A second run of the computer model should reveal which new industries are now attracted to the area under "with" project conditions. The incremental list of industries should be credited to project benefits.

(3) Determination of project area locational advantages after resource modification:

To evaluate the project area's increased competitive advantages after the area's resources availability has been modified to include all the project's output--water transportation, new industrial parks in port areas, increased industrial water supply, etc.--a "synthetic" area community profile can be prepared to include the area's new inventory of location factors. The increment in industries that can

potentially locate in the area, when compared to existing industries in the area, should be credited to project's benefits.

(4) Using the model's output as a planning tool to enhance the project area's locational advantages:

Working in concert with local planning agencies, the model can be used as a planning tool to evaluate how the project complements local planning efforts such that project benefits and communities' objectives are maximized. For example, through the use of industry characteristics profile, a list of industries for which water transportation is an important locational factor can be identified. Through the use of the model, the probable adaptability of such industries to the project area can be evaluated. Should some industries be excluded by the model for lack of some location factors, such factors can be identified and if possible, such deficiencies corrected through joint efforts of local entities and project administrators.

6.0 Concluding Remarks and Recommendations

The objective of this study was to select a methodology with which water navigation project areas can be evaluated as to their comparative advantages to attract manufacturing activities, data that are essential in estimating projects' industrial development benefits.

To accomplish this task, the study focused on a number of analytical tools that are used in the analysis of industrial location. Of the various tools discussed, one, the ILS model, was designed with this study's very purpose in mind: it allows investigators to determine what kind of manufacturing operation can successfully operate in an area, given industry's locational requirements and given areas' resources availability.

While the other techniques discussed are equally effective in determining the adaptability of industry to specific locations, it is felt that the ILS model should merit special consideration for probable adaptability as a tool in analyzing Corps of Engineers projects for the following reasons:

Economy: the ILS model, developed by the Economic Development Administration, is an operational model that is readily available thus eliminating extra model construction costs. Similarly, because of the existence of a wide data base, area analysis, for which data is available can be performed at a minimal cost.

Future Expansion: the only constraint to increasing the scope of the model's applicability is the existence of communities' profiles data. Thus, the model can be expanded to include additional locations through the addition and updating of community profiles, a fairly simple and inexpensive data gathering process.

Recognizing Resource Limitations: perhaps the most important feature of the ILS model is its ability to recognize areas' resources limitations. Unlike most other techniques, where such limitations are ignored, the ILS model is designed to evaluate each area (community) in terms of its inventory of productive factors, matching it against each industry's needs. This matching process yields, for each location, a list of industries for which local resources fulfill their locational requirements. This insures that industries which cannot successfully operate in the area, because of resources' defficiencies, are excluded from the list, thus providing for a more realistic assessment of probable project industrial development benefits.

Having noted the model's major advantages we should also point out some key limitations and problem areas that merit further investigation. These include:

Model Status: as has been mentioned before, the ILS model was developed by the Economic Development Administration which owns and operates the model. Because of the uncertain status of this agency, some problem might arise in transferring the complete program to the Corps of Engineers facilities.

Computer Transferability: preliminary investigations point to some difficulties that might be incurred in attempting to move the computer program from EDA computers to Corps' facilities. It is suspected that the incompatability of the two computers might require some programming changes.

Data Limitations: the ILS model is based upon two sets of data: community profiles and industrys' locational requirements profile. For the model to yield valid results, both data bases need to be

periodically updated. Specifically, further investigation is needed to ascertain whether industrys' locational requirements at present are similar to those expressed in the early 1970s when the original survey was conducted. Similarly, existing community profiles should be checked as to the accuracy of data.

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APPENDIX A

Survey of Manufacturing Plant Characteristics- 1970

APPENDIX A

O.M.B. No. 41-S71009; Approval Expires December 31, 1971

FORM ED-767A
(6-67-71)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS
COLLECTING AND COMPILING AGENT FOR
ECONOMIC DEVELOPMENT ADMINISTRATION

SURVEY OF MANUFACTURING PLANT CHARACTERISTICS

1970

NOTICE – The information supplied on this form will be used only in statistical compilations, and will not be released in any way that will reveal the operations of individual companies.

Group	Survey

RETURN THIS COPY TO:

Bureau of the Census
Jeffersonville Census Operations Office
Jeffersonville, Indiana 47130

(Please correct any error in name and address including ZIP code)

CLASS OF PRODUCTS COVERED BY THIS REPORT: *(See CODE in address box above; refer to description in Reference Manual)*

GENERAL INSTRUCTIONS

Please complete this form for the establishment identified above. The information requested refers to the locational and operational characteristics of this establishment during 1970. Note that no actual data totals are requested on this form. All that is necessary to complete each inquiry is to provide an estimate or rating that most appropriately describes the element or characteristic being studied.

Part A – PLANT LOCATION AND CHARACTERISTICS

Item 1 – Date Plant Constructed

Indicate when this plant was constructed (or underwent MAJOR addition, expansion, or renovation) *(Mark ONE box only)*

0101 ☐ 1960 – 1967
0102 ☐ 1950 – 1959
0103 ☐ Prior to 1950
0109 ☐ CENSUS USE ONLY

Item 2 – Population of City or Place in which Plant is Located *(Mark ONE box only)*

0201 ☐ *50,000 or more – Skip to Item 4*
0202 ☐ Less than 50,000 – *Go to Item 3*

Item 3 – Distance of Plant from city or place with 50,000 or more population *(Mark ONE box only)*

0203 ☐ Less than 50 miles
0204 ☐ 50 miles or more
0209 ☐ CENSUS USE ONLY

Item 4 – Site Characteristics

a. Is this plant located in an industrial park?

0301 ☐ Yes
0302 ☐ No
0309 ☐ CENSUS USE ONLY

b. What is the approximate size of the site (total land area, including physical facilities, parking, outside storage, etc.) occupied by this plant? *(Mark ONE box only)*

0311 ☐ Less than one acre
0312 ☐ 1 – 4 acres
0313 ☐ 5 – 20 acres
0314 ☐ 21 – 50 acres
0315 ☐ 51 – 100 acres
0316 ☐ Over 100 acres
0319 ☐ CENSUS USE ONLY

c. What is the approximate size, in square feet, of occupiable floor space (under roof) of this plant? *(Mark ONE box only)*

Square feet		Square feet	
0321	☐ Less than 10,000	0326	☐ 300,000 – 399,999
0322	☐ 10,000 – 49,999	0327	☐ 400,000 – 499,999
0323	☐ 50,000 – 99,999	0328	☐ 500,000 or more
0324	☐ 100,000 – 199,999	0329	☐ CENSUS USE ONLY
0325	☐ 200,000 – 299,999		

PLEASE CONTINUE ON REVERSE SIDE

Part B – PRODUCT AND MATERIAL DELIVERIES; WATER USE; HOURLY WAGE RATES DURING 1970

Item 5 – Principal Types of Materials Used

How would you classify the materials consumed in the manufacturing operation of this plant?
(Mark ONE box only)

0401 ☐ Principally raw materials, including first stage processing (e.g., debarked logs, graded vegetables, etc.)

0402 ☐ Principally processed materials, including semi-finished and finished products, parts and components (e.g., machinery, semiconductors, furniture core stock, etc.)

0403 ☐ Approximately equal proportions of raw and processed materials.

0409 ☐ CENSUS USE ONLY

Item 6 – Delivery Schedules and Methods of Transportation

INSTRUCTIONS

There are listed below five categories of time schedules and four methods of transportation generally used in shipping manufactured products and in receiving materials from suppliers. Please select and "rate" the three time schedules and the three transportation methods which, in your judgment, accounted for the largest tonnage of products shipped from this plant during 1970. Similarly rate the three time schedules and the three transportation methods which, in your judgment, accounted for the largest tonnage of materials received at the plant during 1970.

Codes for rating items 6a and 6b below:

1 – Largest tonnage 2 – Second largest tonnage 3 – Third largest tonnage

Note: If fewer than three modes of transportation are used or if fewer than three of the specified delivery time schedules apply, use rating codes 1 and/or 2, as appropriate.

6a. Delivery schedule for –	Same day delivery	Overnight delivery	Next day delivery	Two-days delivery	More than two-days delivery	CENSUS USE ONLY
	(Enter appropriate code(s) 1, 2, and 3 from above)					
(1) Products shipped by your plant	0411	0412	0413	0414	0415	0419
(2) Materials received at your plant from suppliers	0431	0432	0433	0434	0435	0439

6b. Method of transportation used for –	Air	Water	Rail	Truck*	CENSUS USE ONLY
	(Enter appropriate code(s) 1, 2, and 3 from above)				
(1) Products shipped by your plant	0421	0422	0423	0424	0429
(2) Materials received at your plant from suppliers	0441	0442	0443	0444	0449

* Exclude short haul deliveries to or from other means of transport.

Item 7 – Water Used During 1970

a. What was the approximate total quantity of water intake during 1970 by this establishment?
(Mark appropriate water-intake size class (millions of gallons per year))

0501 ☐ Under 20 million gallons

0502 ☐ 20 – 99 million gallons

0503 ☐ 100 million gallons or more

b. Does this establishment utilize a public water system for most of its industrial water intake?

0504 ☐ Yes

0505 ☐ No

0509 ☐ CENSUS USE ONLY

Item 8 – Hourly wage rates of production and related workers

Listed to the right is a range of hourly wage rates. Please enter the approximate percentage, rounded to the nearest ten (10) percent, which best describes the proportion of production and related workers in each wage rate range. For example: If 60 percent of the plant's production workers earn between $2.75 and $3.25 per hour and the balance of these workers earn over $4.50 per hour, enter "60" in code box 0602 and "40" in code box 0604.

This category includes workers (up through the working foreman level) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial and watchman services, product development, auxiliary production for plant's own use (e.g., power plant), recordkeeping, and other services closely associated with these production operations at the establishment covered by the report. Supervisory employees above the working foreman level are excluded from this category.

Hourly wage		Percent of production and related workers
a. Under $2.50 per hour	0601	%
b. $2.50 – $3.49 per hour	0602	%
c. $3.50 – $4.49 per hour	0603	%
d. $4.50 or over per hour	0604	%
e. TOTAL (Should equal 100%) →		100 %
CENSUS USE ONLY	0609	
	0619	

Item 9 – PERSON TO BE CONTACTED

Name of person to contact regarding this report				
Address (Number and street, city, State)	ZIP code	Telephone: Area code	Telephone: Number	Telephone: Extension
Signature of authorized person	Title		Date	

FORM ES-707A (4-27-71)

Page 2

APPENDIX B

Survey of Industrial Location Determinants - 1970-1975

APPENDIX B

O.M.B. No. 41-S71009, Approval Expires December 31, 1971

FORM ED-7078
(4-28-71)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS
COLLECTING AND COMPILING AGENT FOR
ECONOMIC DEVELOPMENT ADMINISTRATION

SURVEY OF INDUSTRIAL LOCATION DETERMINANTS

1971 – 1975

NOTICE – The information supplied on this form will be used only in statistical compilations, and will not be released in any way that will reveal the operations of individual companies.

Group | Survey

RETURN THIS COPY TO: Bureau of the Census
Jeffersonville Census Operations Office
Jeffersonville, Indiana 47130

(Please correct any error in name and address including ZIP code)

CLASS OF PRODUCTS COVERED BY THIS REPORT: *(See CODE in address box above; refer to description in Reference Manual)*

GENERAL INSTRUCTIONS

This form is designed to obtain information on various locational requirements which your company would probably consider in arriving at any decision to construct new facilities to manufacture the class of products referred to above. Since your company has been an important manufacturer of these products, we wish to obtain your best evaluation of the locational requirements for the construction of a plant to manufacture this class of products, whether or not you actually plan to construct additional facilities in the forseeable future.

Please note that no actual data totals are requested on this form, all that is necessary is to provide an estimate or rating that most appropriately describes the locational factor being studied.

Item 1 – New or Expanded Manufacturing Plants

For the period 1971–1975, does your company have any tentative plans to establish a plant at a new location, or to expand significantly an existing facility, at which the primary manufactured products would likely be classified in the PRODUCT CLASS covered by this report?

1101 ☐ Yes – Answer the following questions, Items 2 through 8, on the basis of the locational considerations associated with these tentative plans for new or expanded facilities.

1102 ☐ No – Answer the following questions, Items 2 through 8, as if you actually were planning new or expanded facilities on the basis of your general knowledge of current trends and developments influencing location requirements in the manufacture of this product class.

1109 ☐ CENSUS USE ONLY

Item 2 – Location of New or Expanded Establishment

Would you prefer to locate: *(Mark each location "Yes" or "No")*	Yes	No	CENSUS USE ONLY
a. In an industrial park?	2101 ☐	2102 ☐	2109 ☐
b. In the central city of a metropolitan area?	2111 ☐	2112 ☐	2119 ☐
c. In a metropolitan suburban area?	2121 ☐	2122 ☐	2129 ☐
d. In a non-metropolitan area?	2131 ☐	2132 ☐	2139 ☐

Item 3 – Size of Community

What size community would probably be most preferable? (Community ordinarily includes the city and the surrounding areas) *(Mark ONE box only)*

3101 ☐ Under 25,000 population
3102 ☐ 25,000 – 49,999
3103 ☐ 50,000 – 99,999
3104 ☐ 100,000 – 249,999
3105 ☐ 250,000 – 499,999
3106 ☐ 500,000 – 999,999
3107 ☐ 1,000,000 or more population
3109 ☐ CENSUS USE ONLY

Item 4 – Size of Plant Site

What size plant site (total land area, including physical facilities, parking, outside storage, etc.) would probably be most preferable? *(Mark ONE box only)*

4101 ☐ Less than one acre
4102 ☐ 1 – 4 acres
4103 ☐ 5 – 20 acres
4104 ☐ 21 – 50 acres
4105 ☐ 51 – 100 acres
4106 ☐ over 100 acres
4109 ☐ CENSUS USE ONLY

Item 5 – Approximate Number of Employees at New or Expanded Plant

Which employment size class probably best describes the approximate number of employees at a new plant when fully operational (in the preferred location indicated in Items 3 and 4 above)? *(Mark ONE box only)*

4201 ☐ 500 or more employees
4202 ☐ 250 – 499 employees
4203 ☐ 100 – 249 employees
4204 ☐ Under 100 employees
4209 ☐ CENSUS USE ONLY

PLEASE CONTINUE ON REVERSE SIDE

PLEASE READ . . . **INSTRUCTIONS FOR ITEMS 6 AND 7 BELOW**

Use the scale below to rate each one of the community attributes and plant site features listed below. Use code numbers "1" through "5" to represent importance of value with "1" being critical (firm would not consider location if this item was missing), and "5" being minimal or of no significant value

RATING SCALE

Of CRITICAL value	Of IMPORTANT value			Of MINIMAL value
1	2	3	4	5
Firm would not consider location if this critically significant factor was missing	Very significant	Average	Less significant	Minimal factor

Item 6 – Community Attributes to Consider in Plant Location

Please examine the list of community attributes shown below; rate **each one** according to your best judgment of its significance (in terms of availability and/or adequacy) **for a plant primarily engaged in manufacturing the PRODUCT CLASS covered by this report.** *(Use the rating scale above to rate each item)*

Item		Enter code	Item		Enter code
Air passenger service	5111		Pool of unskilled workers	5124	
Local industrial bonds	5112		Lenient industrial zoning (i.e., few and simple industry categories, few restraints on external operations, and liberal availability of variances)	5125	
Vocational training facilities	5113				
Higher educational facilities	5114		Strict industrial zoning (i.e., well-defined industry categories and restraints on external operations)	5126	
Tax incentives or tax holidays	5115				
Fire protection	5116		Size (population) of community (as reported in Item 3)	5127	
Contract trucking	5117		Other critical or important factors – Specify		
Public warehousing	5118			5128	
Public refrigerated warehousing	5119				
Police protection	5121				
Local industrial development group	5122				
Pool of trained workers	5123			5129	

Item 7 – Plant Site Features

Please examine the list of plant site features shown below, rate **each one** according to your judgment of its importance **for a plant primarily engaged in manufacturing the PRODUCT CLASS covered by this report.** *(Use the rating scale above to rate each item)*

Item		Enter code	Item		Enter code
Highway access (within 30 minutes of major highway interchange)	6111		Industrial sewage processing	6119	
Scheduled air freight service	6112		Solid waste disposal	6121	
Water transportation	6113		Soil load-bearing capabilities	6122	
Scheduled rail service	6114		*Plant site size (as reported in Item 4)*	6123	
Piggy back facilities (rail)	6115		Other critical or important factors – Specify		
Industrial water supply (processed)	6116			6124	
Industrial water supply (raw)	6117				
Natural gas service	6118			6124	

Item 8 – Locational Objectives

From the list below, mark only those three (3) items which would probably best reflect your consideration of the major objectives to be achieved by such a planned new and/or expanded facility for the PRODUCT CLASS covered by this report.

7111 ☐ Improvement in transportation efficiency or economy

7112 ☐ Availability of larger parcel of land

7113 ☐ Closer proximity to resources and/or major suppliers

7114 ☐ Closer proximity to other plants of your company

7115 ☐ Closer proximity to your distributors and/or your customers

7116 ☐ Closer proximity to other firms in same or related industries

7117 ☐ Ability to serve new and/or expanded markets

7118 ☐ Minimize competition from other plants for labor force

7119 ☐ *To secure factors of location unique to your industry* (special energy requirements, waste disposal, etc.)

7121 ☐ Other – Specify _____

7121 ☐ Other – Specify _____

7129 ☐ **CENSUS USE ONLY**

Item 9 – PERSON TO BE CONTACTED

Name of person to contact regarding this report				
Address (*Number and street, city, State*)	ZIP code	Telephone		
		Area code	Number	Extension
Signature	Title	Date		

FORM ED-7078 (4-30-71)

★U.S. GOVERNMENT PRINTING OFFICE: 1977—236-456:6326

APPENDIX C

Community Profile Questionnaire

U. S. DEPARTMENT OF COMMERCE
ECONOMIC DEVELOPMENT ADMINISTRATION
INDUSTRIAL DETERMINANTS QUESTIONNAIRE

FILL OUT AS COMPLETELY AND ACCURATELY AS POSSIBLE. THIS FORM WILL BE USED TO ASSIST FIRMS SEEKING SUITABLE PLANT LOCATION SITES. FAILURE TO SUPPLY ALL REQUESTED APPLICABLE INFORMATION MAY RESULT IN LOSS OF A POTENTIAL NEW EMPLOYER. PLEASE INCLUDE SOURCE(S) OF INFORMATION WHERE REQUESTED. DO NOT FILL OUT SECTIONS LABELED "FOR OFFICIAL USE ONLY."

GENERAL INSTRUCTIONS:

1. PLEASE PRINT ALL ANSWERS IN PENCIL

2. The numbers appearing directly after each item on the printed form are codes for the card-punch operator. Please ignore them when completing questionnaire.

3. Where abbreviations are used, omit periods.

4. Where state names are requested, use standard abbreviations.

5. Where District titles are requested, abbreviate directional names, i.e., Southeastern Massachusetts will become SEMASS, or use initials if they are normally used in reference to the EDD, i.e., Indian Development District of Arizona will become IDDA.

6. Where YES or NO (Y or N) answers are indicated, use initial letters, i.e., Y or N.

7. In filling out the blanks, place one figure or letter in each space. Start from the extreme right when using figures. Start from extreme left when using letters.

Example:

Growth Community Within Geographic Entity

NAME	2-15	P	I	K	E	V	I	L	L	E		
1960 Pop.	2-27			6	0	0	0					

8. When a particular answer is not available or not applicable, this precise form must be followed. If the question calls for an alphabetic answer (i.e., letters), write NONE in the blanks. If the question calls for a numeric answer (i.e., figures), write a -0 in the blanks.

Example:

Other Market Areas Within overnight trucking

NAME	4-27	N	O	N	E							
1970 Pop. (est.)	4-39									-	0	

9. Whenever requested information comes from a published document, please give date of the publication.

QUESTIONNAIRE: SPECIFIC INSTRUCTIONS AND DEFINITIONS

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	
NEW GEOGRAPHIC ENTITY	X-13	(✓) 1

SECTION I: GENERAL INFORMATION

Geographic Entity (G.E.): The term Geographic Entity is used herein to mean the specific EDA designation, whether Redevelopment Area or Economic Development District, for which the information is being furnished.

Growth Community (G.C.): The Growth Community in a geographic entity is that town or city which, with its suburban fringe, has the largest population concentration and/or is generally considered to be the area of present and future growth. All other questions referring to the Growth Community should be answered in regard to the one identified in this section.

A. INFORMATION FOR GEOGRAPHIC ENTITY

TYPE (RA or EDD)	1-15
NAME	1-18
1960 POP.	1-30
1970 POP.	1-37
STATE ABBR. 1	1-44
STATE ABBR. 2	1-48
STATE ABBR. 3	1-52

B. GROWTH COMMUNITY WITHIN GEOGRAPHIC ENTITY

NAME	2-15
1960 POP.	2-27
1970 POP.	2-35
1970 POP. WITHIN 50 MI. (est)	2-43
1970 POP. WITHIN 100 MI. (est)	2-51
IS G.C. A DESIGNATED GROWTH CENTER (Y or N)	2-59

FOR OFFICIAL USE ONLY	
SPECIAL AREA CODE	2-60

SOURCE(S) OF ALL SECTION I. INFORMATION: _____

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	

SECTION II: MARKET INFORMATION

SMSA: The initials SMSA stand for Standard Metropolitan Statistical Area. An SMSA is a county or group of counties which contain at least one city of 50,000 inhabitants or more, or "twin cities" with a combined population of at least 50,000. In New England SMSAs consist of towns and cities, rather than counties.

Major Market: This term refers to a SMSA with population in excess of 250,000. Please give name of the nearest such Major Market, regardless of the state in which it may be located.

Where market identification includes more than one city as Minneapolis-St. Paul, Seattle-Tacoma, or San Francisco-Oakland, use only first city name.

A. NEAREST MAJOR MARKET (SMSA WITH 250,000 OR MORE POP.)

NAME	3-15	
1970 POP.	3-27	
SMSA CODE	3-35	
STATE ABBR.	3-38	
RD. MILES FROM G.C.	3-42	

B. NEAREST SMALL MARKET (CITY OTHER THAN NAMED ABOVE WITH 50,000 to 250,000 POP.)

NAME	3-46	
1970 POP.	3-58	
RD. MILES FROM G.C.	3-64	

SOURCE(S) OF ALL SECTION II. INFORMATION: _____

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	

SECTION III: TRANSPORTATION INFORMATION

Major Highway: This term refers to Interstate, U. S. or State highways over which high-speed commercial trucking can be carried.

Interstate Highway Interchange: If nearest interstate highway interchange is located within the Growth Community indicate by 0 in the appropriate question in section (C) below.

Junction of Interstate Highways: Follow same instructions as above.

A. TRUCKING TIME OF MORNING SHIPMENT FROM G.C. TO NEAREST MAJOR MARKET.

CHECK (✓) ONE

(✓)	
4-15	SAME DAY
4-15	NEXT MORNING
4-15	NEXT DAY
4-15	2ND MORNING
4-15	OVER 2 DAYS

B. OTHER MARKET AREAS WITHIN OVERNIGHT TRUCKING

NAME	4-27
1970 POP.	4-39
NAME	4-47
1970 POP.	4-59
NAME	5-15
1970 POP.	5-27
NAME	5-35
1970 POP.	5-47
NAME	5-55
1970 POP.	5-67

C. HIGHWAYS AND ROADS

ROAD MILES FROM G.C. TO MAJOR HIGHWAY ACCESS	6-15
MAJOR HIGHWAY IMPROVEMENTS UNDERWAY IN G.E. (Y or N)	6-18
ESTIMATED COMPLETION YEAR	6-19
PAVED RD. FROM G.C. TO MAJOR HIGHWAY ACCESS (Y or N)	6-23
IMPROVE. TO RD. TO MAJOR HWY. UNDERWAY IN G. C. (Y or N)	6-24
ESTIMATED COMPLETION YEAR	6-25
RD. MILES FROM G.C. TO NEAREST INTERST. HWY. INTERCHG	6-29
RD. MILES FROM G.C. TO JUNCTION OF INTERSTATE HWY'S	6-32

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	

D. TRUCKING AND WAREHOUSING

# TRUCK LINES WITH SCHEDULED SERVICE IN G.E.	6-35	
TRUCK TERMINAL IN G.C. (Y or N)	6-37	
IF (N), MILES TO TRUCK TERMINAL FROM G.C.	6-38	
# TRUCK TERMINALS IN G.E.	6-41	
PUBLIC WAREHOUSE IN G.C. (Y or N)	6-43	
IF (N), MILES TO WAREHOUSE FROM G. C.	6-44	
# PUBLIC WAREHOUSES IN G. E.	6-47	
REFRIG. WAREHOUSE IN G.C. (Y or N)	6-49	
IF (N) MILES TO REFRIG. WAREHOUSE FROM G.C.	6-50	
# REFRIG. WAREHOUSES IN G.E.	6-53	

E. RAILWAYS IN GEOGRAPHIC ENTITY

# RAILROADS OPERATING IN G.E.	6-55	
RECIPROCAL SWITCHING AVAIL. IN G.E. (Y or N)	6-57	
RAIL FREIGHT TERMINAL IN G.E. (Y or N)	6-58	
IF (N), MILES TO FREIGHT TERMINAL FROM G.E.	6-59	
TEAM TRACK AVAIL. IN G.E. (Y or N)	6-61	
IF (N), MILES TO TEAM TRACK FROM G.E.	6-62	
PIGGY BACK RAMP AVAIL. IN G.E. (Y or N)	6-65	
IF (N), MILES TO PIGGY BACK RAMP FROM G.E.	6-66	
FREIGHT HOUSE AVAIL. IN G.E. (Y or N)	6-69	
IF (N), MILES TO FREIGHT HOUSE FROM G.E.	6-70	
RAIL YARD AVAIL. IN G.E. (Y or N)	6-73	
IF (N), MILES TO RAIL YARD FROM G. E.	6-74	

F. RAILWAYS IN GROWTH COMMUNITY

# RAILROADS OPERATING IN G.C.	7-15	
IS RECIPROCAL SWITCHING AVAIL. IN G. C. (Y or N)	7-17	
RAIL FREIGHT TERMINAL IN G.C. (Y or N)	7-18	
TEAM TRACK AVAIL. IN G.C. (Y or N)	7-19	
PIGGY BACK RAMP AVAIL. IN G.C. (Y or N)	7-20	
FREIGHT HOUSE AVAIL. IN G. C. (Y or N)	7-21	
RAIL YARD AVAIL. IN G. C. (Y or N)	7-22	

G. AIR TRANSPORTATION

GENERAL AVIATION AIRFIELD SERVING G. C. (Y or N)	7-23	
MAXIMUM RUNWAY LENGTH (FEET)	7-24	
AIR FREIGHT SERVICE AVAIL. TO G. C. (Y or N)	7-28	
IF (N), MI. TO GEN. AIRFIELD W/AIR FREIGHT SERV.	7-29	
# SCHEDULED COMMERCIAL FLIGHTS TO G.E.	7-32	
IF NONE, MI. TO COMMERCIAL AIRFIELD	7-35	

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	

H. WATER TRANSPORTATION

WATER TRANSPORTATION AT G. C. (Y or N)	7-38	
IF (Y), CONTROLLING DEPTH OF WATER IN FT.	7-39	
IF (N), IS THERE POTEN. FOR DEVEL. OF PORT FACIL. IN G.C. (Y or N)	7-41	
IF (N), MILES FROM G.C. TO PORT FACILITIES	7-42	

TYPE VESSELS SERVED AT NEAREST PORT FACILITIES

BARGES (Y or N)	7-45	
TANKERS (Y or N)	7-46	
BULK CARRIERS (Y or N)	7-47	
GENERAL CARGO (Y or N)	7-48	
CONTAINERIZED (Y or N)	7-49	

SOURCE(S) OF ALL SECTION III. INFORMATION: _____

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	

SECTION IV: INDUSTRY CHARACTERISTICS

Employment by Industry:

1. Employment data for industries in geographic entity may be given as estimates -- use most recent data available.

2. Rank those industries, as called for in Sections IV B., C. and D., in order of estimated importance as employers. A recent issue of County Business Patterns should indicate employment size of major industries. Use two-digit and four-digit Standard Industrial Classification (SIC) Codes.

A. TOTAL NUMBER OF EMPLOYEES BY INDUSTRY FOR GEO. ENTITY

AGRICULTURE	7-50
FORESTRY	7-56
FISHERIES	7-62
MINING	7-68
MANUFACTURING	7-74
TRADE	8-15
SERVICE - INCL TOURISM	8-21
GOVERNMENT (Fed., State, Local - incl. Military)	8-27
TRANS. AND UTILITIES	8-33
CONSTRUCTION	8-39

B. LIST TOP 5 INDUSTRIES, BY FOUR-DIGIT SIC CODE, FOR GEOGRAPHIC ENTITY

8-45
8-49
8-53
8-57
8-61

C. LIST TOP 15 INDUSTRIES, BY TWO-DIGIT SIC CODE, FOR MAJOR MARKET (SMSA) AS IDENTIFIED IN II. A.

9-15	9-25	9-35
9-17	9-27	9-37
9-19	9-29	9-39
9-21	9-31	9-41
9-23	9-33	9-43

FOR OFFICIAL USE ONLY

STATE CODE	X-1					
AREA NUMBER	X-3					
DISTRICT CODE	X-7					

D. LIST TOP 5 INDUSTRIES, BY FOUR-DIGIT SIC CODE, FOR MAJOR MARKET (SMSA) AS IDENTIFIED IN II. A.

9-45				
9-49				
9-53				
9-57				
9-61				

SOURCE(S) OF ALL SECTION IV. INFORMATION_____

FOR OFFICIAL USE ONLY					
STATE CODE	X-1				
AREA NUMBER	X-3				
DISTRICT CODE	X-7				

SECTION V: RESOURCE AVAILABILITY IN COMMERCIAL QUANTITY IN GEOGRAPHIC ENTITY AND CONTIGUOUS AREAS

Commercial Quantity:

Information on resource availability is requested for those products available in quantities sufficient to supply the needs of a new moderate size manufacturing or processing facility, or resources for which known, but undeveloped, potential exists. If resources exist but are not in fact available for a new firm to utilize, they should not be included. Common examples of existing but unavailable resources are forest lands owned by individuals or firms unwilling to sell to outside commercial enterprises, or surveyed mineral deposits held in reserve by owners who do not intend to exploit them in the immediate future.

Other:

Where "other" appears on the questionnaire, please name all similar products not specifically included in the preceding section. If no entry, write NONE

A. AGRICULTURAL PRODUCTS PRODUCED FOR SALE (Y or N)

FIBERS	10-15	
GRAINS	10-16	
VEGETABLES	10-17	
FIELD CROPS	10-18	
FRUITS	10-19	
OTHER HORTICULTURE	10-20	
CATTLE	10-21	
HOGS	10-22	
SHEEP	10-23	
POULTRY	10-24	

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	

B. FOREST PRODUCTS

HARDWOOD - FIRST GRADE (Y or N)	10-25	
ALLOWABLE ANNUAL CUT (Mil Bd.ft.)	10-26	
HARDWOOD - SECOND GRADE (Y or N)	10-32	
ALLOWABLE ANNUAL CUT (Mil Bd. ft.)	10-33	
HARDWOOD - PULPWOOD (Y or N)	10-39	
ALLOW. ANNUAL CUT (cords in thous.)	10-40	
SOFTWOOD - FIRST GRADE (Y or N)	10-46	
ALLOWABLE ANNUAL CUT (Mil Bd. ft.)	10-47	
SOFTWOOD - SECOND GRADE (Y or N)	10-53	
ALLOWABLE ANNUAL CUT (Mil Bd. ft.)	10-54	
SOFTWOOD - PULPWOOD (Y or N)	10-60	
ALLOW. ANNUAL CUT (cords in thous.)	10-61	
OTHER	10-67	

C. FISHERY RESOURCES (Y or N)

MAJOR COMMERCIAL FISH	14-15	
SHELL FISH	14-16	
TRASH FISH	14-17	

D. EXPLOITED MINERAL RESOURCES (Y or N)

COAL	14-18	
OIL	14-19	
NAT. GAS	14-20	
IRON	14-21	
COPPER	14-22	
ZINC	14-23	
CLAY	14-24	
SAND	14-25	
STONE	14-26	
GRAVEL	14-27	
OTHER	14-28	
OTHER	14-40	
OTHER	14-52	

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	

E. MINERAL RESOURCES OF COMMERCIAL VALUE SURVEYED BUT UNDEVELOPED (Y orN)

COAL	15-15	
OIL	15-16	
NAT. GAS	15-17	
IRON	15-18	
COPPER	15-19	
ZINC	15-20	
CLAY	15-21	
SAND	15-22	
STONE	15-23	
GRAVEL	15-24	
OTHER	15-25	
OTHER	15-37	
OTHER	15-49	

SOURCES(S) OF ALL SECTION V. INFORMATION: _____

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	

SECTION VI: INDUSTRIAL PARKS AND SITES SERVING GROWTH COMMUNITY

Industrial Parks and Plant Sites: Industrial Parks are those land sections suitable for multi-plant sites which have been approved by responsible authorities for industrial uses. A Plant Site is an industrially zoned area suitable for a single establishment.

Are there existing or planned Industrial Parks to serve the Growth Community? If yes, complete the questions on Industrial Parks.

Are there available Plant Sites not in Industrial Parks? If yes, complete the questions on Plant Sites.

A. INDUSTRIAL PARKS	Size (in No. of Acres)	All Utilities [1]	Air Transp.	Rail Transp.	Water Transp.	Completion Status [2]
		(Y or N)				
Industrial Park #1 16-15						
Industrial Park #2 16-24						
Industrial Park #3 16-33						
Industrial Park #4 16-42						
Industrial Park #5 16-51						

B. PLANT SITES (Not in Indus. Parks)	Size (in No. of Acres)	All Utilities [1]	Air Transp.	Rail Transp.	Water Transp.
		(Y or			
Plant Site #1 17-15					
Plant Site #2 17-24					
Plant Site #3 17-33					
Plant Site #4 17-42					
Plant Site #5 17-51					

[1] All Utilities: This term refers to the availability of water, sewer, and sewerage systems, commercial power (gas and/or electricity), and highway access (paved road to industrial park and/or plant site).

[2] Enter the appropriate number, as follows:

/1/ - If Industrial Park or Plant Site is available for occupancy

/2/ - If under construction (to be completed within 1 year)

/3/ - If planned (construction to begin with 1 year)

/4/ - If planned (no date set for beginning construction)

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	K-7	

SECTION VII. UTILITY AND ENERGY AVAILABILITY IN GROWTH COMMUNITY

Give availability data for Growth Community and for Industrial Parks/Sites listed in Section VI above.

NOTES: GPD = Gallons per day
M/W = 1 million watts or 1,000 kilowatts
[•] = Decimal point

A. MUNICIPAL WATER AVAILABILITY

EXCESS CAPACITY OVER PEAK DEMAND (in Thousand GPD)	19-15	
IS IT AVAILABLE OUTSIDE OF CITY AREA AT YOUR INDUSTRIAL PARKS AND INDUSTRIAL SITES? ENTER Y or N.	19-21	

B. RAW WATER AVAILABILITY

IS WELL WATER AVAILABLE (Y or N)	19-22	
IS RIVER OR LAKE WATER AVAIL. (Y or N)	19-23	

C. SANITARY SEWAGE SYSTEM AVAILABILITY

SEWAGE DISPOSAL PLANT (Y or N)	19-24	
OR LAGOON (Y or N)	19-25	
SEWAGE TREATMENT PLANT CAPACITY (MILLION GPD)	19-26	•
EXCESS CAPACITY OF SEWAGE TREATMENT PLANT (MILLION GPD)	19-31	•

D. ELECTRIC POWER AVAILABILITY

NAME OF UTILITY COMPANY	19-37	
CAN ACCEPT NEW INDUSTRIAL CUSTOMERS REQUIRING:		
OVER 30 MW/YEAR (VERY LARGE PLANT) (Y OR N)	19-54	
MAXIMUM LENGTH OF CONTRACT (IN NUMBER OF YEARS)	19-55	
10-30 MW/YEAR (LARGE TO MEDIUM PLANT) (Y OR N)	19-57	
MAXIMUM LENGTH OF CONTRACT (IN NUMBER OF YEARS)	19-58	
1-10 MW/YEAR (SMALL PLANT) (Y OR N)	19-60	
MAXIMUM LENGTH OF CONTRACT (IN NUMBER OF YEARS)	19-61	

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	

E. NATURAL GAS AVAILABILITY

NAME OF GAS COMPANY	19-63
CAN ACCEPT NEW INDUSTRIAL CUSTOMERS AT A FIRM RATE (Y OR N)	20-15
MAXIMUM LENGTH OF CONTRACT (IN NUMBER OF YEARS)	20-16
CAN ACCEPT NEW INDUSTRIAL CUSTOMERS ONLY AT AN INTERRUPTIBLE RATE (Y OR N)	20-18
MAXIMUM LENGTH OF CONTRACT (IN NUMBER OF YEARS)	20-19
MAXIMUM AMOUNT OF GAS AVAILABLE TO SERVE A NEW SINGLE INDUSTRIAL CUSTOMER IN 1,000 cu. ft. per day:	20-21

F. SOURCES OF ENERGY

WHAT ARE THE PRINCIPAL SOURCES OF INDUSTRIAL ENERGY USED IN AND AROUND YOUR GROWTH COMMUNITY? (ENTER Y OR N)
COAL 20-25 ELECTRICITY 20-26 NATURAL GAS 20-27
OIL 20-28

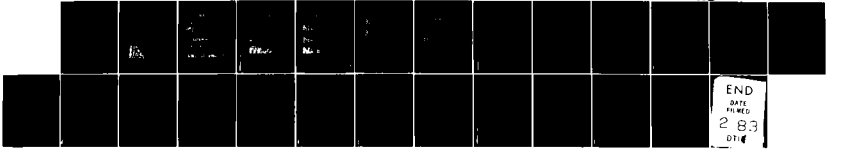
G. AVAILABILITY OF INDUSTRIAL FUELS.

ARE THE FOLLOWING INDUSTRIAL FUELS AVAILABLE IN YOUR COMMUNITY? (Y OR N) COAL 20-29, No. 5 OR No. 6, RESIDUAL FUEL OIL 20-30
DISTILLATE FUEL 20-31, LPG 20-32

SOURCE(S) OF ALL SECTION VII. INFORMATION: _____

AD-A123 128 DETERMINING INDUSTRIAL COMPARATIVE ADVANTAGES IN AREAS OF PROPOSED WATER..(U) ARMY ENGINEER INST FOR WATER RESOURCES FORT BELVOIR VA S BEN-ZVI DEC 81 IWR-81-C06 2/2

UNCLASSIFIED F/G 13/2 NL



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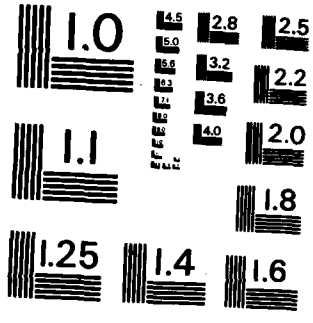

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	

SECTION VIII: HUMAN RESOURCES IN LABOR AREA

NOTE: Utilize the State Training and Employment Service as primary source for all labor area and labor force information.

Labor Area: "Labor Area" means a geographical area consisting of a central city or cities and surrounding territory within commuting distance in which there is a concentration of economic activity or labor demand, and workers can generally change jobs without changing their residences. Use the labor area most commonly associated with the Growth Community.

Labor Force Data: Information on the current characteristics of the labor area's labor force should be available from the local employment security office, that is, the local offices of the State Training and Employment Service. If official figures are unavailable, use the local Employment Security Office or state estimates.

A. LABOR FORCE - CURRENT DATA (OFFICIAL DATA OR ESTIMATES)

NAME OF LABOR AREA	20-41
TOTAL NUMBER IN LABOR FORCE	20-56
NUMBER UNEMPLOYED	20-62
NUMBER UNDEREMPLOYED	20-67
TOTAL NUMBER SKILLED	20-72
NUMBER SKILLED (MALE)	21-15
NUMBER SKILLED (FEMALE)	21-21
NUMBER SKILLED UNEMPLOYED	21-26
TOTAL NUMBER SEMI-SKILLED	21-30
NUMBER SEMI-SKILLED (MALE)	21-36
NUMBER SEMI-SKILLED (FEMALE)	21-42
NUMBER SEMI-SKILLED UNEMPLOYED	21-47
TOTAL PROF. AND TECH. IN MANUF.	21-52
PROF. AND TECH. IN MANUF. (MALE)	21-57
PROF. AND TECH. IN MANUF. (FEMALE)	21-62

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	

B. WAGE RATES * (PER HOUR AVG.)

COMMON LABOR	21-67		•		
LIGHT ASSEMBLY	21-71		•		
HEAVY ASSEMBLY	21-75		•		
MACHINIST CLASS C	22-15		•		
MACHINIST CLASS A	22-19		•		
SET-UP MAN	22-23		•		
MAINTENANCE HELPER	22-27		•		
MAINTENANCE MECH.	22-31		•		
WELDER ARC/GAS	22-35		•		
INSPECTOR SIMPLE	22-39		•		
INSPECTOR PRECISION	22-43		•		
TOOL AND DIE MAKER	22-47		•		

* FILL IN ONLY THOSE SKILLS OR THE EQUIVALENT IN TERMS OF SKILL THAT ARE AVAILABLE IN LABOR AREA.

C. TRAINING FACILITIES AND ASSISTANCE

1. VOCATIONAL AND TECHNICAL EDUCATION

LOCATED WITHIN COMMUTING DISTANCE OF G.C. (Y or N)	22-51	
AVAILABLE TO HIGH SCHOOL STUDENTS (Y or N)	22-52	
AVAILABLE TO ADULTS (Y or N)	22-53	

2. STATE AND FEDERAL MANPOWER TRAINING PROGRAMS

ANY CONDUCTED IN G.E. SINCE 1962 (Y or N)	22-54	
AVAILABLE IN G.E. LAST YEAR (Y or N)	22-55	

D. EDUCATIONAL INSTITUTIONS

1. AVAILABLE WITHIN GEOGRAPHIC ENTITY

JR. COLLEGE (Y or N)	22-56	
4-YR COLLEGE (Y or N)	22-57	
GRAD. INSTITUTION (Y or N)	22-58	

2. AVAILABLE WITHIN COMMUTING DISTANCE OF THE GROWTH COMMUNITY

JR. COLLEGE (Y or N)	22-59	
4-YR COLLEGE (Y or N)	22-60	
GRAD. INSTITUTION (Y or N)	22-61	

SOURCE(S) OF ALL SECTION VIII. INFORMATION: _____

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	

SECTION IX: COMMUNITY SERVICES AND ASSISTANCE

Police Force: Include only full-time employees in Growth Community. If community is served by state or county police force, give number assigned full-time to community.

Fire Insurance: Fire insurance rating refers to local rates currently in effect. These rates, which should be entered as numeric figures, can be obtained from local insurance company agents.

Industrial Zoning Ordinances: By lenient is meant here a few simple industry categories; few restraints on external operations; and liberal availability of variances.

By strict is meant here well-defined industry categories and restraints on external operations.

A. COMMUNITY SERVICES IN GROWTH COMMUNITY

SIZE OF POLICE FORCE	22-62	
COMMUNITY FIRE INS. RATING	22-66	
INDUSTRIAL BLDG. FIRE INS. RATING	22-68	- 0

B. ASSISTANCE TO NEW INDUSTRY

TAX INCENTIVES AVAILABLE IN G.C. (Y or N)	22-70	Y (strict)
TAX INCENTIVES AVAIL. IN GEO. ENTITY (Y or N)	22-71	Y
INDUSTRIAL BONDS PERMITTED IN G.C. (Y or N)	22-72	
INDUSTRIAL BONDS PERMITTED IN GEO. ENTITY (Y or N)	22-73	
INDUST'L BONDS APPROVED IN G.C. IN LAST 5 YRS (Y or N)	22-74	
INDUST'L BONDS APPROVED IN GEO. ENTITY IN LAST 5 YRS (Y or N)	22-75	
LENIENT INDUST'L ZONING ORDINANCES IN EFFECT IN G.C. (Y or N)	22-76	
STRICT INDUST'L ORDINANCES IN EFFECT IN G.C. (Y or N)	22-77	

SOURCE(S) OF ALL SECTION IX. INFORMATION: _____

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	X-7	

SECTION X: PUBLIC AND PRIVATE LOCAL DEVELOPMENT ORGANIZATIONS

A. PUBLICLY SUPPORTED PLANNING COMMISSION

NAME 23-15	
ADDRESS (STREET)	23-42
ADDRESS (CITY, STATE, ZIP)	23-60
TELEPHONE NO.	24-15 (-, -)
CHIEF OFFICER (NAME)	24-27
CHIEF OFFICER (TITLE)	24-45
YEAR ESTABLISHED	24-63

B. LOCAL DEVELOPMENT CORPORATION

NAME 25-15	
ADDRESS (STREET)	25-42
ADDRESS (CITY, STATE, ZIP)	25-60
TELEPHONE NO.	26-15 (-, -)
CHIEF OFFICER (NAME)	26-27
CHIEF OFFICER (TITLE)	26-45
YEAR ESTABLISHED	26-63

C. HOUSING AUTHORITY

NAME 27-15	
ADDRESS (STREET)	27-42
ADDRESS (CITY, STATE, ZIP)	27-60
TELEPHONE NO.	28-15 (-, -)
CHIEF OFFICER (NAME)	28-27
CHIEF OFFICER (TITLE)	28-45
YEAR ESTABLISHED	28-63

FOR OFFICIAL USE ONLY

STATE CODE	X-1
AREA NUMBER	X-3
DISTRICT CODE	X-7

D. PRIVATE SERVICE ORGANIZATION

NAME	29-15
ADDRESS (STREET)	29-42
ADDRESS (CITY, STATE, ZIP)	29-60
TELEPHONE NO.	30-15
CHIEF OFFICER (NAME)	30-27
CHIEF OFFICER (TITLE)	30-45
YEAR ESTABLISHED	30-63

E. OTHER

NAME	31-15
ADDRESS (STREET)	31-42
ADDRESS (CITY, STATE, ZIP)	31-60
TELEPHONE NO.	32-15
CHIEF OFFICER (NAME)	32-27
CHIEF OFFICER (TITLE)	32-45
YEAR ESTABLISHED	32-63

SOURCE(S) OF ALL SECTION X. INFORMATION: _____

_____

_____

_____

_____

_____

FOR OFFICIAL USE ONLY		
STATE CODE	X-1	
AREA NUMBER	X-3	
DISTRICT CODE	K-7	

SECTION XI. INDUSTRIAL DEVELOPMENT ACTIVITY

1. IS YOUR STAFF ACTIVELY ENGAGED IN THE PROMOTION OF INDUSTRIAL DEVELOPMENT IN YOUR AREA (Y OR N) [37-15]

2. IF NOT, DOES YOUR STATE'S INDUSTRIAL DEVELOPMENT OFFICE PROMOTE YOUR AREA'S INDUSTRIAL DEVELOPMENT (Y OR N) [37-16]

3. IN CASE BOTH ABOVE ANSWERS ARE NEGATIVE, ENTER BELOW THE ORGANIZATION PROMOTING YOUR INDUSTRIAL DEVELOPMENT

NAME [37-17]	
ADDRESS (STREET)	37-44
ADDRESS (CITY, STATE, ZIP)	37-61
TELEPHONE NO.	38-15 - -
CHIEF OFFICER (NAME)	38-27
CHIEF OFFICER (TITLE)	38-44
YEAR ESTABLISHED	38-61

SECTION XII.

PLEASE INDICATE BELOW NAME, ADDRESS, AND TELEPHONE NUMBER OF THE PERSON TO WHOM INQUIRIES CONCERNING THIS QUESTIONNAIRE CAN BE MADE.

NAME: _____

TITLE: _____

ORGANIZATION: _____

ADDRESS: _____

_____

TELEPHONE NO. Area Code (___) ___-____

APPENDIX D

ILS Output: Industry Ranking for Muskogee, Oklahoma

INDUSTRY RANKING BY GRADE FOR THE EASTERN OKLAHOMA EDD

GROWTH COMMUNITY IS MUSKOGEE OKLAHOMA

THIS COMMUNITY HAS SATISFIED ALL CRITICAL REQUIREMENTS FOR INDUSTRIES LISTED BELOW

GRADE A INDUSTRIES (INDUSTRIES FOR WHICH THIS COMMUNITY SCORED BETWEEN 90.0
---------- AND 100.0 % OF THE TOTAL POSSIBLE SCORE)

SIC - 22562
NAME- CIRCULAR KNIT FABRICS
PCT OF TOTAL- 100.0

SIC - 22720
NAME- TUFTED CARPETS AND RUGS
PCT OF TOTAL- 100.0

SIC - 27321
NAME- BOOK AND PAMPHLET PRINTING LITHOGRAPHIC PROCESS
PCT OF TOTAL- 100.0

SIC - 27611
NAME- MANIFOLD BUSINESS FORMS CONTINUOUS
PCT OF TOTAL- 100.0

SIC - 28182
NAME- MISCELLANEOUS ACYCLIC CHEMICALS AND CHEMICAL PR
PCT OF TOTAL- 100.0

SIC - 30792
NAME- FOAMED PLASTICS PRODUCTS
PCT OF TOTAL- 100.0

SIC - 30795
NAME- INDUSTRIAL PLASTICS PRODUCTS
PCT OF TOTAL- 100.0

SIC - 32210
NAME- GLASS CONTAINERS
PCT OF TOTAL- 100.0

SIC - 33214
NAME- MISCELLANEOUS GRAY IRON CASTINGS
PCT OF TOTAL- 100.0

SIC - 33220
NAME- MALLEABLE IRON CASTINGS
PCT OF TOTAL- 100.0

SIC - 33232
NAME- MISCELLANEOUS CARBON STEEL CASTINGS
PCT OF TOTAL- 100.0

SIC - 33233
NAME- MISCELLANEOUS ALLOY STEEL CASTINGS
PCT OF TOTAL- 100.0

SIC - 33574
NAME- COMMUNICATION WIRE AND CABLE
PCT OF TOTAL- 100.0

SIC - 34211
NAME- CUTLERY SCISSORS SHEARS TRIMMERS AND SNIPS
PCT OF TOTAL- 100.0

SIC - 34411
NAME- FABRICATED STRUCTURAL IRON AND STEEL FOR BUILDI
PCT OF TOTAL- 100.0

SIC - 34413
NAME- MISCELLANEOUS FABRICATED STRUCTURAL IRON AND ST
PCT OF TOTAL- 100.0

INDUSTRY RANKING BY GRADE FOR THE EASTERN OKLAHOMA EDD

GROWTH COMMUNITY IS MUSKOGEE OKLAHOMA

THIS COMMUNITY HAS SATISFIED ALL CRITICAL REQUIREMENTS FOR INDUSTRIES LISTED BELOW

GRADE A INDUSTRIES (INDUSTRIES FOR WHICH THIS COMMUNITY SCORED BETWEEN 90.0 AND 100.0 % OF THE TOTAL POSSIBLE SCORE, CONT.)

SIC - 35223
NAME- PLANTING SEEDING AND FERTILIZING MACHINERY
PCT OF TOTAL- 100.0

SIC - 35319
NAME- MISCELLANEOUS CONSTRUCTION MACHINERY
PCT OF TOTAL- 100.0

SIC - 35451
NAME- SMALL CUTTING TOOLS FOR MACHINE TOOLS
PCT OF TOTAL- 100.0

SIC - 35621
NAME- BALL BEARINGS(COMPLETE)
PCT OF TOTAL- 100.0

SIC - 36211
NAME- FRACTIONAL HORSEPOWER MOTORS
PCT OF TOTAL- 100.0

SIC - 36343
NAME- MISCELLANEOUS SMALL HOUSEHOLD ELECTRIC APPLIANC
PCT OF TOTAL- 100.0

SIC - 36794
NAME- COILS TRANSFORMERS REACTORS AND CHOKES FOR ELEC
PCT OF TOTAL- 100.0

SIC - 39410
NAME- GAMES AND TOYS
PCT OF TOTAL- 100.0

SIC - 27521
NAME- MAGAZINE AND PERIODICAL LITHOGRAPHIC PRINTING O
PCT OF TOTAL- 96.9

SIC - 26213
NAME- COATED PRINTING AND CONVERTING PAPER
PCT OF TOTAL- 96.7

SIC - 38312
NAME- SIGHTING AND FIRE CONTROL EQUIPMENT MADE FROM L
PCT OF TOTAL- 96.2

SIC - 28790
NAME- INSECTICIDAL AND FUNGICIDAL PREPARATIONS
PCT OF TOTAL- 96.1

SIC - 38711
NAME- CLOCKS CLOCK MOVEMENTS AND TIMING MECHANISMS
PCT OF TOTAL- 96.0

SIC - 36426
NAME- OTHER NONRESIDENTIAL ELECTRIC AND NONELECTRIC L
PCT OF TOTAL- 96.0

SIC - 35481
NAME- ROLLING MILL MACHINERY AND EQUIPMENT
PCT OF TOTAL- 95.9

SIC - 37991
NAME- AUTOMOBILE TRAILERS
PCT OF TOTAL- 95.8

INDUSTRY RANKING BY GRADE FOR THE EASTERN OKLAHOMA EDD

GROWTH COMMUNITY IS MUSKOGEE OKLAHOMA

THIS COMMUNITY HAS SATISFIED ALL CRITICAL REQUIREMENTS FOR INDUSTRIES LISTED BELOW

GRADE A INDUSTRIES (INDUSTRIES FOR WHICH THIS COMMUNITY SCORED BETWEEN 90.0 AND 100.0 % OF THE TOTAL POSSIBLE SCORE, CONT.)

SIC - 35482
NAME- POWER DRIVEN HAND TOOLS
PCT OF TOTAL- 95.5

SIC - 26472
NAME- SANITARY TISSUE HEALTH PRODUCTS
PCT OF TOTAL- 94.7

SIC - 34790
NAME- COATING ENGRAVING AND ALLIED SERVICES
PCT OF TOTAL- 94.4

SIC - 26530
NAME- CORRUGATED AND SOLID FIBER BOXES
PCT OF TOTAL- 94.0

SIC - 27612
NAME- MANIFOLD BUSINESS FORMS UNIT SET
PCT OF TOTAL- 93.9

SIC - 33572
NAME- COPPER AND COPPER BASE ALLOY WIRE
PCT OF TOTAL- 93.5

SIC - 27524
NAME- FINANCIAL AND LEGAL PRINTING LITHOGRAPHIC
PCT OF TOTAL- 93.5

SIC - 35362
NAME- OVERHEAD TRAVELING CRANES AND MONORAIL SYSTEMS
PCT OF TOTAL- 93.2

SIC - 35592
NAME- FOUNDRY MACHINERY AND EQUIPMENT
PCT OF TOTAL- 95.3

SIC - 38513
NAME- MISCELLANEOUS OPHTHALMIC GOODS
PCT OF TOTAL- 94.5

SIC - 34432
NAME- FABRICATED STEEL PLATE
PCT OF TOTAL- 94.1

SIC - 35422
NAME- PRESSES INCLUDING FORGING PRESSES
PCT OF TOTAL- 94.0

SIC - 36220
NAME- GENERAL INDUSTRY POWER CIRCUIT DEVICES AND CONT
PCT OF TOTAL- 93.7

SIC - 36792
NAME- CAPACITORS FOR ELECTRONIC APPLICATIONS
PCT OF TOTAL- 93.5

SIC - 33996
NAME- HEAT TREATING OF METAL FOR THE TRADE
PCT OF TOTAL- 93.2

SIC - 35227
NAME- LAWNMOWERS AND SNOW BLOWERS
PCT OF TOTAL- 93.2

INDUSTRY RANKING BY GRADE FOR THE EASTERN OKLAHOMA EDD

GROWTH COMMUNITY IS MUSKOGEE OKLAHOMA

THIS COMMUNITY HAS SATISFIED ALL CRITICAL REQUIREMENTS FOR INDUSTRIES LISTED BELOW

GRADE A INDUSTRIES (INDUSTRIES FOR WHICH THIS COMMUNITY SCORED BETWEEN 90.0 AND 100.0 % OF THE TOTAL POSSIBLE SCORE, CONT.)

SIC - 30794
NAME- PACKAGING AND SHIPPING CONTAINERS
PCT OF TOTAL- 93.0

SIC - 38511
NAME- OPHTHALMIC FRONTS AND TEMPLES
PCT OF TOTAL- 92.9

SIC - 25420
NAME- METAL PARTITIONS ETC AND OFFICE AND STORE FIXTU
PCT OF TOTAL- 92.4

SIC - 34618
NAME- MISCELLANEOUS STAMPED AND PRESSED METAL END PRO
PCT OF TOTAL- 92.3

SIC - 35314
NAME- POWER CRANES DRAGLINES SHOVELS AND PARTS AND AT
PCT OF TOTAL- 92.1

SIC - 25221
NAME- METAL OFFICE SEATING ETC
PCT OF TOTAL- 91.8

SIC - 35595
NAME- OTHER SPECIAL INDUSTRY MACHINERY AND EQUIPMENT
PCT OF TOTAL- 91.6

SIC - 34970
NAME- METAL FOIL AND LEAF
PCT OF TOTAL- 91.3

SIC - 34945
NAME- METAL FITTINGS FLANGES AND UNIONS FOR PIPING SY
PCT OF TOTAL- 92.9

SIC - 28993
NAME- MISCELLANEOUS CHEMICALS AND CHEMICAL PREPARATIO
PCT OF TOTAL- 92.5

SIC - 35351
NAME- CONVEYORS AND CONVEYING EQUIPMENT
PCT OF TOTAL- 92.4

SIC - 35662
NAME- SPEED CHANGERS INDUSTRIAL HIGH SPEED DRIVES AND
PCT OF TOTAL- 92.1

SIC - 34231
NAME- MECHANICS HAND SERVICE TOOLS
PCT OF TOTAL- 92.0

SIC - 35811
NAME- AUTOMATIC MERCHANDISING MACHINES
PCT OF TOTAL- 91.7

SIC - 33610
NAME- ALUMINUM AND ALUMINUM BASE ALLOY CASTINGS
PCT OF TOTAL- 91.3

SIC - 26431
NAME- PAPER GR[illegible]RS AND VARIETY BAGS
PCT OF TOTAL- 91.2

INDUSTRY RANKING BY GRADE FOR THE EASTERN OKLAHOMA EDD

GROWTH COMMUNITY IS MUSKOGEE OKLAHOMA

THIS COMMUNITY HAS SATISFIED ALL CRITICAL REQUIREMENTS FOR INDUSTRIES LISTED BELOW

GRADE A INDUSTRIES (INDUSTRIES FOR WHICH THIS COMMUNITY SCORED BETWEEN 90.0 AND 100.0 % OF THE TOTAL POSSIBLE SCORE. CONT.)

SIC - 34943
NAME- OTHER METAL VALVES FOR PIPING SYSTEMS AND EQUIP
PCT OF TOTAL- 91.1

SIC - 35672
NAME- FUEL FIRED INDUSTRIAL FURNACES AND OVENS
PCT OF TOTAL- 90.8

SIC - 24326
NAME- SOFTWOOD VENEER
PCT OF TOTAL- 90.7

SIC - 24323
NAME- SOFTWOOD PLYWOOD
PCT OF TOTAL- 90.5

SIC - 34431
NAME- HEAT EXCHANGERS AND STEAM CONDENSERS
PCT OF TOTAL- 90.3

SIC - 34233
NAME- FILES RASPS AND FILE ACCESSORIES AND OTHER HAND
PCT OF TOTAL- 90.2

SIC - 36113
NAME- OTHER ELECTRICAL MEASURING INSTRUMENTS
PCT OF TOTAL- 90.0

SIC - 26217
NAME- UNBLEACHED KRAFT PACKAGING
PCT OF TOTAL- 91.1

SIC - 28213
NAME- THERMOPLASTIC RESINS
PCT OF TOTAL- 90.8

SIC - 35857
NAME- OTHER REFRIGERATION AND AIR CONDITIONING EQUIPM
PCT OF TOTAL- 90.7

SIC - 36621
NAME- COMMERCIAL INDUSTRIAL AND MILITARY ELECTRONIC C
PCT OF TOTAL- 90.4

SIC - 35485
NAME- OTHER METALWORKING MACHINERY
PCT OF TOTAL- 90.3

SIC - 35853
NAME- COMMERCIAL REFRIGERATION EQUIPMENT
PCT OF TOTAL- 90.2

INDUSTRY RANKING BY GRADE FOR THE EASTERN OKLAHOMA EDD

GROWTH COMMUNITY IS MUSKOGEE OKLAHOMA

THIS COMMUNITY HAS SATISFIED ALL CRITICAL REQUIREMENTS FOR INDUSTRIES LISTED BELOW

GRADE B INDUSTRIES (INDUSTRIES FOR WHICH THIS COMMUNITY SCORED BETWEEN 80.0 AND 89.9 % OF THE TOTAL POSSIBLE SCORE)

SIC - 36424
NAME- VEHICULAR LIGHTING EQUIPMENT
PCT OF TOTAL- 89.9

SIC - 35414
NAME- GRINDING AND POLISHING MACHINES
PCT OF TOTAL- 89.9

SIC - 35224
NAME- PLOWS LISTERS HARROWS ROLLERS PULVERIZERS AND S
PCT OF TOTAL- 89.8

SIC - 26432
NAME- SPECIALTY BAGS AND LINERS
PCT OF TOTAL- 89.7

SIC - 37321
NAME- INBOARD MOTOR BOATS
PCT OF TOTAL- 89.6

SIC - 36793
NAME- RESISTORS FOR ELECTRONIC APPLICATIONS
PCT OF TOTAL- 89.6

SIC - 34460
NAME- ARCHITECTURAL AND ORNAMENTAL METAL WORK
PCT OF TOTAL- 89.5

SIC - 35316
NAME- MIXERS PAVERS AND RELATED EQUIPMENT
PCT OF TOTAL- 89.4

SIC - 36442
NAME- ELECTRIC CONDUIT AND CONDUIT FITTINGS
PCT OF TOTAL- 89.2

SIC - 33525
NAME- EXTRUDED ALUMINUM ROD BAR AND OTHER EXTRUDED SH
PCT OF TOTAL- 89.1

SIC - 29116
NAME- LIQUEFIED REFINERY GASES
PCT OF TOTAL- 89.0

SIC - 34616
NAME- METAL COMMERCIAL AND HOME CANNING CLOSURES
PCT OF TOTAL- 89.0

SIC - 35423
NAME- MISCELLANEOUS METAL FORMING MACHINE TOOLS
PCT OF TOTAL- 89.0

SIC - 35370
NAME- INDUSTRIAL TRUCKS TRACTORS TRAILERS STACKERS AN
PCT OF TOTAL- 88.8

SIC - 35418
NAME- MISCELLANEOUS METAL CUTTING TYPE MACHINE TOOLS
PCT OF TOTAL- 88.4

SIC - 33911
NAME- DROP UPSET AND PRESS STEEL FORGINGS
PCT OF TOTAL- 88.4

INDUSTRY RANKING BY GRADE FOR THE EASTERN OKLAHOMA EDD

GROWTH COMMUNITY IS MUSKOGEE OKLAHOMA

THIS COMMUNITY HAS SATISFIED ALL CRITICAL REQUIREMENTS FOR INDUSTRIES LISTED BELOW

GRADE B INDUSTRIES (INDUSTRIES FOR WHICH THIS COMMUNITY SCORED BETWEEN 80.0 AND 89.9 % OF THE TOTAL POSSIBLE SCORE, CONT.)

SIC - 35521
NAME- TEXTILE MACHINERY
PCT OF TOTAL- 88.2

SIC - 35591
NAME- CHEMICAL MANUFACTURING INDUSTRIES MACHINERY
PCT OF TOTAL- 88.0

SIC - 27526
NAME- OTHER COMMERCIAL LITHOGRAPHIC PRINTING
PCT OF TOTAL- 87.6

SIC - 37510
NAME- BICYCLES MOTORCYCLES MOTORBIKES SCOOTERS AND PA
PCT OF TOTAL- 87.3

SIC - 27525
NAME- ADVERTISING PRINTING, LITHOGRAPHIC
PCT OF TOTAL- 87.0

SIC - 36511
NAME- HOUSEHOLD AND AUTOMOBILE RADIOS AND RADIO/PHONO
PCT OF TOTAL- 86.8

SIC - 34710
NAME- ELECTROPLATING PLATING AND POLISHING
PCT OF TOTAL- 86.3

SIC - 28345
NAME- PHARMACEUTICAL PREPARATIONS ACTING ON DIGESTIVE
PCT OF TOTAL- 85.8

SIC - 35221
NAME- WHEEL TRACTORS AND ATTACHMENTS
PCT OF TOTAL- 88.1

SIC - 28191
NAME- SYNTHETIC AMMONIA NITRIC ACID AND AMMONIUM COMP
PCT OF TOTAL- 87.7

SIC - 36410
NAME- ELECTRIC LAMPS BULBS ONLY
PCT OF TOTAL- 87.5

SIC - 30796
NAME- CONSTRUCTION PLASTICS PRODUCTS
PCT OF TOTAL- 87.1

SIC - 35613
NAME- DOMESTIC WATER SYSTEMS AND PUMPS
PCT OF TOTAL- 86.9

SIC - 33212
NAME- CAST IRON PRESSURE PIPE AND FITTINGS
PCT OF TOTAL- 86.6

SIC - 35623
NAME- OTHER ROLLER BEARINGS COMPLETE
PCT OF TOTAL- 85.9

SIC - 38213
NAME- INDUSTRIAL PROCESS INSTRUMENTS
PCT OF TOTAL- 85.6

INDUSTRY RANKING BY GRADE FOR THE EASTERN OKLAHOMA

GROWTH COMMUNITY IS MUSKOGEE OKLAHOMA EDD

THIS COMMUNITY HAS SATISFIED ALL CRITICAL REQUIREMENTS FOR INDUSTRIES LISTED BELOW

GRADE B INDUSTRIES (INDUSTRIES FOR WHICH THIS COMMUNITY SCORED BETWEEN 80.0 AND 89.9 % OF THE TOTAL POSSIBLE SCORE. CONT.)

SIC - 27910
NAME- TYPESETTING AND TYPOGRAPHIC WORK
PCT OF TOTAL- 85.4

SIC - 27522
NAME- LABEL EXCLUDING CLOTH AND WRAPPER PRINTING
PCT OF TOTAL- 85.1

SIC - 36341
NAME- ELECTRIC FANS
PCT OF TOTAL- 85.0

SIC - 35551
NAME- PRINTING PRESSES
PCT OF TOTAL- 84.7

SIC - 35442
NAME- INDUSTRIAL MOLDS
PCT OF TOTAL- 84.6

SIC - 32291
NAME- TABLE KITCHEN ART AND NOVELTY GLASSWARE
PCT OF TOTAL- 84.0

SIC - 36422
NAME- COMMERCIAL AND INSTITUTIONAL TYPE ELECTRIC FIXT
PCT OF TOTAL- 83.7

SIC - 20860
NAME- BOTTLED AND CANNED SOFT DRINKS
PCT OF TOTAL- 83.6

SIC - 33578
NAME- POWER WIRE AND CABLE
PCT OF TOTAL- 85.3

SIC - 28151
NAME- CYCLIC INTERMEDIATES
PCT OF TOTAL- 85.1

SIC - 34612
NAME- JOB STAMPINGS
PCT OF TOTAL- 84.8

SIC - 38311
NAME- OPTICAL INSTRUMENTS AND LENSES
PCT OF TOTAL- 84.6

SIC - 35225
NAME- HARVESTING MACHINERY
PCT OF TOTAL- 84.2

SIC - 33577
NAME- MAGNET WIRE
PCT OF TOTAL- 83.9

SIC - 36742
NAME- TRANSISTORS
PCT OF TOTAL- 83.7

SIC - 22561
NAME- WARP KNIT FABRICS
PCT OF TOTAL- 83.5

INDUSTRY RANKING BY GRADE FOR THE EASTERN OKLAHOMA EDD

GROWTH COMMUNITY IS MUSKOGEE OKLAHOMA

THIS COMMUNITY HAS SATISFIED ALL CRITICAL REQUIREMENTS FOR INDUSTRIES LISTED BELOW

GRADE B INDUSTRIES (INDUSTRIES FOR WHICH THIS COMMUNITY SCORED BETWEEN 80.0
---------- AND 89.9 % OF THE TOTAL POSSIBLE SCORE. CONT.)

SIC - 28342
NAME- PHARMACEUTICAL PREPARATIONS ACTING ON CENTRAL N
PCT OF TOTAL- 83.5

SIC - 28445
NAME- MISCELLANEOUS COSMETICS AND TOILET PREPARATIONS
PCT OF TOTAL- 83.3

SIC - 36425
NAME- FLOODLIGHTING AND OTHER OUTDOOR LIGHTING EQUIPM
PCT OF TOTAL- 83.3

SIC - 37992
NAME- FARM WAGONS PUSH CARTS BOAT TRAILERS ETC
PCT OF TOTAL- 83.3

SIC - 28152
NAME- SYNTHETIC ORGANIC DYES
PCT OF TOTAL- 82.7

SIC - 27322
NAME- BOOK AND PAMPHLET PRINTING OTHER PROCESSES
PCT OF TOTAL- 82.5

SIC - 37910
NAME- TRAILER COACHES
PCT OF TOTAL- 82.5

SIC - 35663
NAME- OTHER MECHANICAL POWER TRANSMISSION EQUIPMENT
PCT OF TOTAL- 82.5

SIC - 35199
NAME- PARTS AND ACCESSORIES FOR INTERNAL COMBUSTION E
PCT OF TOTAL- 82.2

SIC - 36741
NAME- INTEGRATED MICROCIRCUITS
PCT OF TOTAL- 82.2

SIC - 25223
NAME- METAL OFFICE CABINETS AND CASES
PCT OF TOTAL- 82.1

SIC - 34942
NAME- VALVES FOR POWER TRANSFER
PCT OF TOTAL- 81.9

SIC - 35991
NAME- CARBURETORS PISTONS AND PISTON RINGS AND VALVES
PCT OF TOTAL- 81.1

SIC - 24324
NAME- NONWOOD FACE PLYWOOD
PCT OF TOTAL- 81.0

SIC - 35483
NAME- ACETYLENE WELDING AND CUTTING APPARATUS
PCT OF TOTAL- 80.9

SIC - 35593
NAME- PLASTIC-WORKING MACH AND WQUIP AND PARTS
PCT OF TOTAL- 80.8

INDUSTRY RANKING BY GRADE FOR THE EASTERN OKLAHOMA EDD

GROWTH COMMUNITY IS MUSKOGEE OKLAHOMA

THIS COMMUNITY HAS SATISFIED ALL CRITICAL REQUIREMENTS FOR INDUSTRIES LISTED BELOW

GRADE B INDUSTRIES (INDUSTRIES FOR WHICH THIS COMMUNITY SCORED BETWEEN 80.0 AND 89.9 % OF THE TOTAL POSSIBLE SCORE, CONT.)

SIC - 35318
NAME- SCRAPERS GRADERS ROLLERS AND OFF HIGHWAY TRUCKS
PCT OF TOTAL- 80.6

SIC - 38410
NAME- SURGICAL AND MEDICAL INSTRUMENTS APPARATUS AND
PCT OF TOTAL- 80.6

SIC - 38421
NAME- SURGICAL ORTHOPEDIC AND PROSTHETIC APPLIANCES A
PCT OF TOTAL- 80.6

SIC - 38111
NAME- AERONAUTICAL NAUTICAL AND NAVIGATIONAL INSTRUME
PCT OF TOTAL- 80.5

SIC - 38611
NAME- STILL PICTURE EQUIPMENT
PCT OF TOTAL- 80.4

SIC - 34492
NAME- PREFABRICATED AND PORTABLE METAL BUILDINGS AND
PCT OF TOTAL- 80.2

GRADE C INDUSTRIES (INDUSTRIES FOR WHICH THIS COMMUNITY SCORED BETWEEN 70.0 AND 79.9 % OF THE TOTAL POSSIBLE SCORE)

SIC - 36622
NAME- RADIO AND TELEVISION BROADCAST EQUIPMENT
PCT OF TOTAL- 79.7

SIC - 35671
NAME- ELECTRIC INDUSTRIAL FURNACES AND OVENS
PCT OF TOTAL- 79.4

SIC - 35412
NAME- DRILLING MACHINES
PCT OF TOTAL- 79.4

SIC - 36743
NAME- DIODES AND RECTIFIERS
PCT OF TOTAL- 79.3

SIC - 27891
NAME- EDITION LIBRARY AND OTHER HARD COVER BOOK BINDI
PCT OF TOTAL- 79.2

SIC - 35650
NAME- INDUSTRIAL PATTERNS OF WOOD METAL ETC
PCT OF TOTAL- 79.0

SIC - 39112
NAME- JEWELRY MADE OF PRECIOUS METALS EXCEPT PLATINUM
PCT OF TOTAL- 78.9

SIC - 33512
NAME- ROLLED DRAWN AND EXTRUDED COPPER AND COPPER BAS
PCT OF TOTAL- 78.9

SIC - 33231
NAME- STEEL INVESTMENT CASTINGS ALL GRADES
PCT OF TOTAL- 78.7

SIC - 35690
NAME- OTHER GENERAL INDUSTRIAL MACHINERY
PCT OF TOTAL- 78.5

INDUSTRY RANKING BY GRADE FOR THE EASTERN OKLAHOMA EDD

GROWTH COMMUNITY IS MUSKOGEE OKLAHOMA

THIS COMMUNITY HAS SATISFIED ALL CRITICAL REQUIREMENTS FOR INDUSTRIES LISTED BELOW

GRADE C INDUSTRIES (INDUSTRIES FOR WHICH THIS COMMUNITY SCORED BETWEEN 70.0 AND 79.9 % OF THE TOTAL POSSIBLE SCORE. CONT.)

SIC - 38512
NAME- OPHTHALMIC FOCUS LENSES INCLUDING CONTACT LENSE
PCT OF TOTAL- 78.3

SIC - 36512
NAME- HOUSEHOLD TELEVISION RECEIVERS
PCT OF TOTAL- 77.7

SIC - 35661
NAME- PLAIN BEARINGS AND BUSHINGS
PCT OF TOTAL- 77.2

SIC - 37423
NAME- STREET CARS PARTS AND ACCESSORIES FOR RAILROAD
PCT OF TOTAL- 77.0

SIC - 35361
NAME- HOISTS
PCT OF TOTAL- 76.4

SIC - 38111
NAME- INTEGRATING INSTRUMENTS ELECTRICAL
PCT OF TOTAL- 76.2

SIC - 25312
NAME- PUBLIC BUILDING AND RELATED FURNITURE
PCT OF TOTAL- 74.9

SIC - 35611
NAME- INDUSTRIAL PUMPS
PCT OF TOTAL- 72.8

SIC - 35540
NAME- PAPER INDUSTRIES MACHINERY AND PARTS AND ATTACH
PCT OF TOTAL- 77.8

SIC - 35612
NAME- HYDRAULIC FLUID POWER PUMPS AND MOTORS AND VACU
PCT OF TOTAL- 77.3

SIC - 26543
NAME- MISCELLANEOUS SANITARY FOOD CONTAINERS
PCT OF TOTAL- 77.1

SIC - 36112
NAME- TEST EQUIPMENT FOR TESTING ELECTRICAL RADIO AND
PCT OF TOTAL- 77.0

SIC - 34980
NAME- FABRICATED PIPE AND FITTINGS
PCT OF TOTAL- 76.3

SIC - 35731
NAME- ELECTRONIC DATA PROCESSING MACHINES
PCT OF TOTAL- 75.1

SIC - 35415
NAME- LATHES
PCT OF TOTAL- 73.9

SIC - 34941
NAME- AUTOMATIC REGULATING AND CONTROL VALVES
PCT OF TOTAL- 71.5

INDUSTRY RANKING BY GRADE FOR THE EASTERN OKLAHOMA EDD

GROWTH COMMUNITY IS MUSKOGEE OKLAHOMA

THIS COMMUNITY HAS SATISFIED ALL CRITICAL REQUIREMENTS FOR INDUSTRIES LISTED BELOW

GRADE C INDUSTRIES (INDUSTRIES FOR WHICH THIS COMMUNITY SCORED BETWEEN 70.0 AND 79.9 % OF THE TOTAL POSSIBLE SCORE, CONT.)

SIC - 22952
NAME- VINYL COATED FABRICS
PCT OF TOTAL- 70.9

SIC - 36430
NAME- CURRENT CARRYING WIRING DEVICES
PCT OF TOTAL- 70.3

APPENDIX E

ILS Output: Community Ranking for Industry SIC 27322

COMMUNITY RANKINGS FOR INDUSTRY 27322 BOOK AND PAMPHLE. PRINTING OTHER PROCESSES

COMMUNITIES LISTED BELOW SATISFIED ALL CRITICAL LOCATIONAL REQUIREMENTS
AND RANK IN THE TOP 50 COMMUNITIES

-- GEOGRAPHIC ENTITY --		-- GROWTH COMMUNITY --					
NAME	TYPE	CITY	STATE	COUNT	RANK	TOTAL POINTS	PERCENT OF TOTAL
GREEN RIVER	EDD	HENDERSON	KY	1	1	887	87.65
SOUTHCENTRAL	EDD	SHELBYVILLE	TENN	2	2	874	86.36
LOWERCHATTAH	EDD	COLUMBUSPHEN	GA	3	3	838	82.81
BARREN RIVER	EDD	BOWLING GRN.	KY	4	3	838	82.81
NORTHWESTFLA	EDD	PANAMA CITY	FLA	5	5	835	82.51
PENNYRILE	EDD	HOPKINSVILLE	KY	6	5	835	82.51
GREEN RIVER	EDD	OWENSBORO	KY	7	5	835	82.51
SOUTHEAST TN	EDD	CLEVELAND	TENN	8	8	810	80.04
GOLDEN TRIAN	EDD	STARKVILLE	MISS	9	9	801	79.15
SMPDD	EDD	PASCAGOULA	MISS	10	10	792	78.26
COASTAL AREA	EDD	HINESVILLE	GA	11	11	789	77.96
EAST TENN	EDD	KNOXVILLE	TENN	12	11	789	77.96
COASTAL AREA	EDD	BRUNSWICK	GA	13	13	786	77.67
COASTAL AREA	EDD	SAVANNAH	GA	14	13	786	77.67
SOUTHEASTERN	EDD	WILMINGTON	N.C.	15	13	786	77.67
LOW SAVANNAH	EDD	NO. AUGUSTA	S.C.	16	13	786	77.67
SOUTHEAST TN	EDD	ATHENS	TENN	17	13	786	77.67
TOP OF ALABA	EDD	HUNTSVILLE	ALA	18	18	783	77.37
NORTHGEORGIA	EDD	DALTON	GA	19	18	783	77.37
EAST CENTRAL	EDD	MERIDIAN	MISS	20	18	783	77.37
GOLDEN TRIAN	EDD	WESTPOINT	MISS	21	18	783	77.37
MID-EAST	EDD	GREENVILLE	N.C.	22	18	783	77.37
PEE DEE	EDD	DARLINGTON	S.C.	23	18	783	77.37

COMMUNITY RANKINGS FOR INDUSTRY 27322 BOOK AND PAMPHLE. PRINTING OTHER PROCESSES

COMMUNITIES LISTED BELOW SATISFIED ALL CRITICAL LOCATIONAL REQUIREMENTS
AND RANK IN THE TOP 50 COMMUNITIES

-- GEOGRAPHIC ENTITY --		-- GROWTH COMMUNITY --					
NAME	TYPE	CITY	STATE	COUNT	RANK	TOTAL POINTS	PERCENT OF TOTAL
MID CUMBERLD	EDD	MURFREESBORO	TENN	24	18	783	77.37
UP SAVANNAH	EDD	GREENWOOD	S.C.	25	25	771	76.19
LOWCHATTAHOO	EDD	COLUMBUSPHEN	ALA	26	26	758	74.90
LOW SAVANNAH	EDD	AIKEN	S.C.	27	26	758	74.90
EAST TENN	EDD	ALCOA	TENN	28	26	758	74.90
EAST TENN	EDD	MARYVILLE	TENN	29	26	758	74.90
CHATT-FLINT	EDD	CARROLLTON	GA	30	30	755	74.60
CUMBERLANDVA	EDD	LONDON	KY	31	31	752	74.31
SMPDD	EDD	HATTIESBURG	MISS	32	31	752	74.31
THREE RIVERS	EDD	TUPELO MISS	MISS	33	31	752	74.31
SOUTHWESTERN	EDD	WAYNESVILLE-	N.C.	34	31	752	74.31
SOUTHCENTRAL	EDD	TULLAHOMA	TENN	35	31	752	74.31
CENTRAL ALA	EDD	GREENVILLE	ALA	36	36	749	74.01
SE ALA EDD	EDD	DOTHAN	ALA	37	36	749	74.01
SOUTH EAST	EDD	ANDALUSIAOPP	ALA	38	36	749	74.01
HEART OF GA	EDD	DUBLIN	GA	39	36	749	74.01
HEART OF GA	EDD	EAST DUBLIN	GA	40	36	749	74.01
CENT SAVANNA	EDD	SWAINSBORO	GA	41	36	749	74.01
BARREN RIVER	EDD	GLASGOW	KY	42	36	749	74.01
NORTHCENTRAL	EDD	GREENWOOD	MISS	43	36	749	74.01
NORTHCENTRAL	EDD	GRENADA MISS	MISS	44	36	749	74.01
CENTRAL MISS	EDD	JACKSON MISS	MISS	45	36	749	74.01
CENTRAL MISS	EDD	VICKSBURG	MISS	46	36	749	74.01

COMMUNITY RANKINGS FOR INDUSTRY 27322 BOOK AND PAMPHLE. PRINTING OTHER PROCESSES

COMMUNITIES LISTED BELOW SATISFIED ALL CRITICAL LOCATIONAL REQUIREMENTS
AND RANK IN THE TOP 50 COMMUNITIES

-- GEOGRAPHIC ENTITY --		-- GROWTH COMMUNITY --					
NAME	TYPE	CITY	STATE	COUNT	RANK	TOTAL POINTS	PERCENT OF TOTAL
EAST TENN	EDD	MORRISTOWN	TENN	47	36	749	74.01
SOUTHWESTERN	EDD	WAYNESVILLE-	N.C.	48	48	746	73.72
LINCOLNTRAIL	EDD	RADCLIFF	KY	49	49	743	73.42
COASTALPLAIN	EDD	VALDOSTA	GA	50	50	740	73.12
PURCHASEAREA	EDD	PADUCAH KY	KY	51	50	740	73.12
NORTH DELTA	EDD	CLARKSDALE	MISS	52	50	740	73.12
THREE RIVERS	EDD	ABERDEEN	MISS	53	50	740	73.12

Ben-Zvi, Samuel.

Determining industrial comparative advantages in areas of proposed water navigation projects : an industrial location analysis : a report / submitted to U.S. Army Corps of Engineers, Water Resources Support Center, Institute for Water Resources : by U.S. Army Corps of Engineers, Tulsa District : Samuel Ben-Zvi.--[Fort Belvoir, Va. : Institute for Water Resources], 1981.

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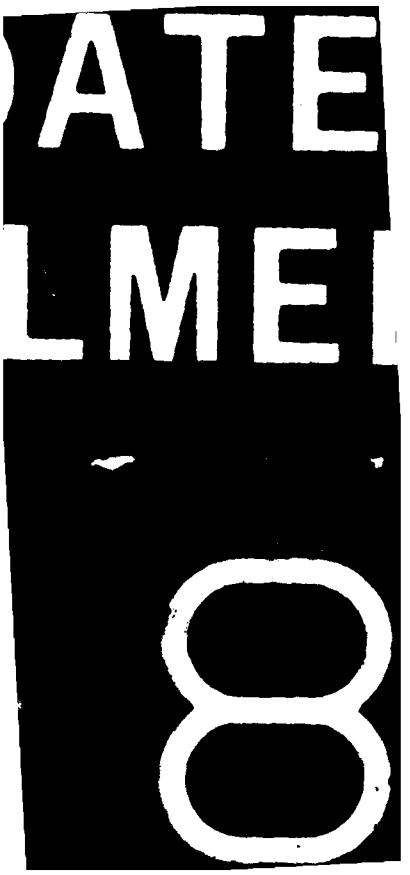
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